

# LETTERS AND PAPERS

ON

AGRICULTURE, PLANTING, &c.

ADDRESSED TO THE

BATH AND WEST OF ENGLAND SOCIETY,

FOR THE ENCOURAGEMENT OF

Agriculture, Arts, Manufactures, and Commerce.

VOLUME IX.

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## INTRODUCTION.

CONTAINING

An Account of various Topics of Experiment and Observation, which have engaged the Attention of this Society since the Publication of the last Volume.

[By the SECRETARY.]

IN a period of publick affairs so peculiar as the present, in which the minds of men of all ranks have been constantly occupied, if not agitated, with political reflections; it is not wonderful that the correspondence of a provincial society should have been less abundant than, from its increasing numbers, might have been otherwise expected.—This having been really the case, a consequent delay, somewhat beyond the usual period, has attended the publication of this Ninth Volume. But the most active members of the society, strongly desirous of promoting that general usefulness which may be expected from the efforts of such an associated body, have felt a proportionate solicitude on this subject.

The humble writer of the following introductory pages, feeling as he does the responsibility of his situation, has not been one of the least desirous to make such an arrangement

of useful matter as may prove worthy of the publick attention. His official intercourse with ingenious men has operated as a stimulus to a statement of opinions, which, however they may have originally occurred to his own mind, he has deemed important in proportion as they have been strengthened by the correspondent reflections of others, whom it is his duty to respect. And as constant experience has proved to him, that among the numerous members, with whom it is his privilege and pleasure to converse, many are found who would be reluctant to give their thoughts in writing, to which they are not accustomed; or to have their names quoted for particular opinions, however worthy of being published; he feels it his duty to endeavour to consolidate those opinions in the best manner he can. With a view to the discharge of such a publick duty, the following statements are made.—The thoughts may often be no otherwise new, or valuable, than as they have resulted from new occasions of remark, and fresh convictions of their importance, under new occurrences, in the domestick situation of our country.

The great objects of such a society as this, are the promotion of those various improvements in the management of land, which are at once called for by a general publick duty, and by the particular *increase of population*, which is naturally to be expected in an orderly and liberal community; an increase which is now generally considered as a very important matter of fact in this kingdom.

Political calculations have varied, and may be expected to vary, about the degree of an *increasing population*, as well as respecting the *publick benefit* of an augmentation of numbers; but taking it as a fact, that an increasing call for the necessaries of human life exists, (and few will be found to doubt it) the duty of an adequate industry in using the means

means appointed by Providence to supply it, *i. e.* to "replenish the earth," is urgent in the same proportion.—The Creator and Preserver of men has commanded it—and he knows the fitness and rectitude of his own laws: the derived principles of benevolence enjoin it—and the consciousness of an active attention will furnish, to those the most ardently concerned for promoting publick and private happiness, a sufficient reward. A continued increase, therefore, of rational endeavours to the ends in view, cannot fail to extend the aggregate usefulness and honour of this society; and to add a distinguishing dignity to the highest of its members. The contributions and activity of the least considerable will be found important to the whole, and therefore every individual may find a laudable incentive to that activity which lies within his sphere. But for the aid of the most powerful example, the society must naturally look to those members, who, from the extent of their means and possessions, have the largest scope for exertion. Such gentlemen have it abundantly in their power to give efficiency to the publick and patriotic labours of a society, whose chief business it is to collect and diffuse knowledge. And comparatively happy will it be for this country, when many of those gentlemen shall become less solicitous to increase their quantity of landed property, than to improve, to the fullest extent, what they already have. Daily experience evinces, that a more general and strict adherence to this principle of domestick policy would be attended with advantages, national and private, which are really incalculable. To understand the mode of conduct by which they can render the most essential service to the internal prosperity of this country, it becomes necessary for such gentlemen constantly to consider, in the most close and particular manner, what are the useful improvements of which their possessions

are the most capable? In other words, *how they may be rendered the most productive of human sustenance, and the most numerous instances of human comfort?*

Under this general head of enquiry, different branches of improvement present themselves for consideration:—

As, 1st. Whether the nearest lands, or those attached to the mansion, be the most advantageously divided, and applied to their most productive and proper uses?—Whether the owners occupy any wet or boggy lands, which may be rendered more valuable by easy draining, or new intersections, so as to increase, to the greatest extent, the quantity of healthy pasture for sheep and cattle?—Whether any spring, or stream of water, run to waste, which may be turned on to some part of the pastures for water-meadow? Under this idea, the great advantage of floating pasture-lands, now generally known, should be well considered, in comparison with the frequent unproductiveness of various natural pastures in dry seasons: and that though a stream may be very insignificant in itself, and make a very obscure figure through a rushy or sedgy ditch, it is sometimes possible, by erecting a dam across a particular part of the stream, to obtain a considerable head of water, sufficient to float many acres; which would otherwise be of small use. And a ton of hay per acre increased in quantity, and materially improved in quality, beside the future great improvements of the ground, are objects of present and lasting importance. —Whether, after procuring the greatest possible quantity of grass and hay, the establishment does not include some unnecessary horses, by which too much of that grass and hay is unprofitably consumed, instead of sustaining sheep or cattle for the *food of man*? Should this latter be the case, (which is not uncommon) the longer such horses are kept back from the *market*, the more will the habit of so keeping them

them operate as an improper cause of demand for *colts*, instead of *sheep and cattle*.—Whether a small farm, or farms, might not be easily divided off, and lett from the nut-skirts, without, perhaps, materially injuring the compactness, or beauty, or convenience, of the whole? And if the latter may be done,—whether any sufficient publick-spirited reason can be found, to prevent an addition to the publick stock of such useful occupiers? And lastly,—whether some favourable corner or slice of ground, near a road, and near running water, may not as a consequence be allotted for building two or three neat, plain cottages, with sufficient garden, to accommodate some deserving labourers already married; or some able young men, who may wish, or be thereby induced to wish, to marry, (instead of increasing the immorality and disorder of illicit connexion) and become sober and useful members of society?—Such a labourer, wherever he can be planted, will have the strongest inducements to become exemplary in his character, and doubly useful to his benefactor.

2dly. Whether the *distant farms* are so divided and apportioned into large and middle-sized, as to be most suitable to the general state, or gradation, of farms in the district; and especially whether a small pasture, or grazing, farm may not be advantageously parted off from a large one; which, by only building a cheap farm-house, little bigger than a cottage, may make room for another useful farmer; a man, who, by close attention to that kind and degree of husbandry which can be managed with a small capital, may turn such portion of ground to an improved account, and be at the same time subservient to the greater interests of the community—in raising an additional number of young pigs, the various kinds of poultry, stocks of bees, &c.?—A small orchard-plantation of half an acre, or an acre, more or less,

may

may be an useful and ornamental appendage\* to all such lots of property; and if the plantation be made duly open, the greater part of the ground may also be used to advantage, in raising potatoes, cabbage, &c. for the supply of the family; and any superfluous produce would always be useful, in the feeding of pigs and cattle. It has, indeed, been questioned by some gentlemen, for whose judgment the writer entertains much respect, whether an acre of orchard-ground be equally valuable, *communibus annis*, with the produce of the same ground in corn crops? But independent of the advantage of *variety*, there can be little doubt but that an acre of orchard-ground, judiciously planted, so as to admit of under-cropping, especially with potatoes, the dig-

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\* Considered in an ornamental point of view, such a plantation is highly important. An orchard *in bloom*, or ripening *with fruit*, is one of the most pleasing pictures of village scenery. The succession occupies a considerable part of the year, and the produce, in sundry ways of consumption, is truly valuable. We are prone to envy the advantages of warmer climates, in which the luxuriant growth of oranges, grapes, peaches, nectarines, &c. is almost spontaneous; but we, in many parts of our own country, neglect the cultivation of fruits congenial to our climate; and, perhaps, if properly selected and improved, equally delicious, or salubrious.—This remark applies particularly to many parts of *Wales*, in which horticulture is almost abandoned. The want of fruits, and the frequent eating of salted aliments, not the most delicately cured, seem to have a visible effect on the constitutions of many of the inhabitants, which their ill-fermented malt liquors, where they can be indulged in, are but poorly adapted to correct. As the orchards become neglected, the inducement, however strange, seems to increase for the *destruction* even of very good ones, i. e. to prevent their becoming objects of *plunder*. A general exertion for new plantations becomes daily more urgent on Welsh land-owners, who regard the beauty and future profit of their domains, were the pleasure of giving a supply of cheap and pleasant fruit to their tenants, and the Welsh towns, out of the question.

ging

ging and manuring for which will improve the fruit-trees, must be more valuable than any succession of corn crops that could possibly be raised at an equal, or even superior, expence. (An *excessive* quantity of orcharding is not to be contended for. Leases on such small farms being far less necessary, than on large or middle-sized arable ones, they may in general be considered as situations on which to prove and encourage the industry and moral excellence of an intermediate class of men; who, under a kind and fostering patronage, may be highly useful and exemplary in rural life.)

3dly. Whether the larger farms be duly proportioned, and provisions in leases be wisely inserted to keep them duly proportioned, as to *pasture* and *arable*? And whether the most hilly and poor spots of the soil be suitable for, and if so, kept sufficiently cropped with, that most valuable and excellent article, *fainfoin*; which, as a cheap, easily-managed, and abundant source of feeding, is in many places too little cultivated, and even known? If a common objection against such careful regulations be here urged, i. e. that tenants will, in general, for their own interest, so occupy and crop, or depasture their land, as to turn it to best account by meeting and supplying the greatest demand at market; we have to oppose to this general doctrine, the notorious fact, that the *indolence*, the *carelessness*, the *want of sagacity*, the *obstinacy*, and the *want of publick principle* in tenants, are too often found—more enlightened and liberal as may be the major part.

4thly. Whether any part or parts of such farms be easily susceptible of the advantage of watering, for improved meadow? And if such advantages have been over-looked before *leasing*, whether the farmer may not be induced, by persuasion or subsequent agreement, to come into the plan of such an improvement, on encouraging or equal terms?

5thly. Whether

5thly. Whether the important article of *wood plantation* has been sufficiently attended to on every considerable farm? And if not, whether a speedy improvement may not be forthwith agreed on (if a farm be under lease) for a new plantation, in the most proper place or places, both with regard to shelter and ornament; particularly of the best quick-growing trees, as Scotch and other firs, the *Abele*, the *Chestnut*, the *Cedar of Lebanon*, and the *Larch*? These trees, exclusive of their beauty, will be found expeditiously valuable; and will furnish the means of constant improvement in farm and cottage buildings.\* The *Ash*, the *Beech*, the *Elm*, and the *Oak*, in many places seem also to have been too little regarded, with a view to the successive interests of future generations. And it seldom happens, but some part or parts of the largest farms may be selected for a moderate plantation of these valuable trees, without any material injury, but often to the great probable advantage of the tenant, or of future tenants, in open and exposed situations.—The inattention which prevails in many parts of this country, to the cultivation of timber-trees, is a subject of just regret! It is a first principle of rural economy, and founded in obedience and gratitude to the great Author of Nature, that men should cultivate, improve, and adorn, as well the districts they are born to inhabit, as the general state and capacities of their

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\* Even the most common of timber-trees, (if it be properly called one) “the willow by the water-courses,” is in many instances too much neglected. That kind of wood for laths and other purposes has risen considerably in price of late years. The plantation is one of the most cheap and easy that can be conceived, and in most districts, near towns, plants of moderate size will pay 7l. per head, for a seven years’ growth. Now, one pound per annum for a score of willows, growing along the marshy side of a single acre, proves that more are wanted.

minds,

minds, by all the known means in their power. Local improvement, by labour and study, is a kind of inferior creation, which the Creator of the Universe seems to have appointed, as the proper and most dignified employment of man; necessarily reserving to *himself* the perpetual supply of that principle of life and blessing, by which alone it can be carried on! Dreariness and barrenness are the comparative deformity of his works, and partly designed as the natural exemplification of an uncultivated mind. Plantation, as a provision for verdure, beauty, and usefulness, is the duty of the highest inhabitant of the soil. It is evidently conducive to universal benefit. It provides for the security and comfort of animated nature. It is one visible, exterior mean of maintaining an intellectual intercourse with the exalted Author of all life, and all benediction!—The beauty of Oriental description may be remembered with peculiar advantage—“Instead of the thorn shall come up the fir-tree;” “and instead of the brier shall come up the myrtle-tree;” and (as COVERDALE renders it): “this shall be done to the “praise of the LORD, and for an everlasting token.”

To apply these mementos to our own profit, let us consider the abundant improvements that await the hand of ingenious activity in our country. Not only inclosures may be benefited by ornamental shelter for cattle, if judiciously disposed, and unfriendly blasts broken from numerous corn-fields;\* but if we extend our views of improvement to

\* The writer is fortified in his opinion of the vast importance of a judicious plantation of rows and clumps of trees in open countries, by the declarations of men of the first eminence in corn-farming. It having been often observed, how great the difference is in the crops between those parts where a similar noxious wind is broken, and where *unobstructed* in its course, in the same line of exposure.—By observation, most old inhabitants and servants, on the same

many of our barren hills and down lands, the object becomes equally grand and encouraging. The whole is not to be considered as the work of this or the next generation; but whoever has the power of *beginning*, if but on a small scale, has the power of beginning to set an example, of which future generations will reap the advantage, and may gradually carry on, to the delight and profit of their successors. And if fertility of hills, and redemption from unprofitable barrenness, leave not a source of gratitude and rational pleasure to posterity, what better effects can be expected from our indolence and sloth?

Nothing has been more common than for men of patriotick minds to wish to transmit the advantages of *political* institutions, not only unimpaired, but improved, to posterity; this is confessedly the true spirit of patriotism. It has generally obtained the tribute of gratitude and praise. Emulation of posthumous praise is the most noble, because the least interested. Every man who judiciously plants an useful tree, fixes a living memorial of himself; the man, who, with superior ability and judgment, plants a grove, though it may at last be his lot to be forgotten, may be sure that the benefits of his existence will remain.

6thly. Whether sufficient care be taken in the leasing of farms to prefer tenants of a disposition to *neatness* in the general management of lands; to encourage such by particular commendations; and to admonish the slovenly and negligent, when they are found inattentive to their *duty*?— For a *duty* it undoubtedly is, for every tenant, independently

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same farm, are able to point out those parts of the fields which, on the average, suffer most from adverse winds; and consequently the best situations for planting clumps, and small groves, are easily ascertainable.

of

of his general skill in the course of cropping his arable, and of stocking his pasture, to have a special regard to the *cleanness* and *neatness*, and consequently the greatest *productiveness*, of his husbandry: a duty which he owes to the community, and in the neglect of which he is a highly-culpable member of society; for though his bargain may be so easy, and his soil so good, that even under slovenly management he may be able to pay his rent, and get money, the community is suffering a constant loss by his mis-management; and still further by his bad example, so far forth as that example has an influence on other young and inexperienced farmers.\*— In the present state of *population*, to which we have alluded, and for which we ought sedulously to provide; when the general complaint of *too little land being under cultivation* seems to be too well-founded, special care should be taken, by the best possible economy, to render what we have in the greatest degree productive. A slovenly farmer is one of the greatest internal enemies of his country. To a man of common discernment, the appearance of many of our lands, in particular districts, is at once mortifying and disgusting; to the benevolent and patriotick observer, it is often *afflictive*. For though the general fertility of this comparatively-happy island, under the benign influences of the Author of Nature, is such, that *famine* rarely invades, however unworthy of universal plenty, the mass of its inhabitants; yet it cannot

12\* It is well known, that on a farm where one of the publick trials of ploughs was made for the premiums of this society, the soil was so full of couch-grafs, that large roots were taken out after the ploughs several yards long. The farmer was of course bantered on his system of husbandry. He asserted the utility of couch-grafs for feeding his cows—and sat all better reasoning at defiance, by asserting, that he had “ proved the goodness of his farming by laying by “ 500l. per annum, for twenty years past! And so, let *thick* as can “ do better, try.”!

but

but be known, that pining *scarcity* is the frequent portion of some, against whom no particular indolence or moral turpitude may be imputable. And this, perhaps, if we except the miserable secret chambers of crowded cities, is more frequently the case in obscure villages, and solitary huts in the country, than elsewhere; in those very abodes of poverty, which may be nearest situated to the field of the sluggard, of which we complain!—These poor people might be much relieved, in a two-fold sense, by a conduct the reverse of that under consideration. They want *labour*, by which to add an important trifle to their income. The slovenly farmer wants, or ought to know that he wants, an additional hand or two, or perhaps three, on his farm, to clean and scour out his ditches and drains, to remove his numerous thorns, briers, furze, docks, and thistles, which are suffered to grow, and increase unmolested from year to year, on some of the most convenient of his pastures. Such negligence always operates to the impoverishment of the soil, and to the prevention of more valuable produce in milk, butter, cheese, and butcher's-meat, than would suffice to nourish, to their hearts' content, twice the number of those poor people whom he ought to employ. The corn-fields of such a man are often a copious mixture of grain and weeds, abundant in proportion to the natural strength of the soil—the advantage of which he stupidly counteracts; and on his miserable plan, one acre in ten—perhaps, of those under the plough, one in five—is thrown away. This latter proportion of loss, alarming as it should be, is not uncommon even in improved districts. On a comparison of the worst practice with that of the best known, the proportion of positive loss will readily be conceived to be much greater! When the produce of a well-cultivated acre, through the routine of judicious cropping, is considered, and then the

aggregate

aggregate produce of as many well-cultivated acres, as are often lost to the publick by bad farmers, in one extensive parish; the conclusion is obvious, that more is frequently lost to the community in such a parish than would suffice to render completely comfortable all the poor in *two* such parishes, were their families *doubly numerous!* The employment and the produce are lost together; population is checked; disgrace is transmitted from father to son; and human misery is left (and, unless gentlemen interpose a more watchful attention, will be left) to complain without remedy.\* The *national* scale of this grievance is next to be considered; and who, without indignation, can endure the picture?

\* Few are the farms, of any considerable extent, on which it would not be good œconomy, and constantly profitable, to keep at least one diligent man wholly employed through the year in removing thorns, brambles, docks, and thistles; cleaning ditches, opening drains, mending fences, cutting hedges, spreading mole-hills, and the droppings of manure, &c. And should these various objects prove too few for his employment, (which is not very probable) the trimming and turning hills of compost, so as to prevent weeds from growing and shedding their seeds on such manure, will be sure to fill up his whole time. On large inclosed farms *two* such men may frequently be kept well employed; especially where the practice includes the raising of cabbage for feeding, and the cultivation of potatoes in orchards, on banks, and in otherwise unprofitable corners. When the advantages of such objects are placed in comparison with the wages of a man at about *twenty pounds* per annum, the argument in their favour must be obvious; independently of the pleasure arising to the farmer, from the superior neatness of his fields, and the credit he will not fail to acquire with his landlord and the publick. To gentlemen, who farm *their own* estates, these minute attentions will not be considered as less important: in addition to the profits directly resulting from the system, the more extensive good of *teaching by example* will have its growing influence with them.

Some

Some particular districts of the nation have acquired a well-deserved character for *general* farming excellence, including the very important article of cleanliness over all their ground; but *slowness* in agriculture are found every where—in many counties they abound; and the publick loss is enormous. But in proportion to the extent of it we may derive hopes of a future growing provision, under a gradually-improving system, excited by a vigilant attention, on the part of land-owners, to the skill and proper industry of their tenants. From this last source of improvement *alone*, can any great national advantages be expected.

In addition to the complaint of *slowly farming*, two grievances, or supposed grievances, are still frequently mentioned at these rooms—the too common conversion of contiguous small farms into large ones, and the immoderate raising of rents; both these evils, so far as they exist, are among the effects of a proper free-agency in the owners of lands, which no friend to general liberty can wish to see extinguished. But to hasten a correction of an evil, by fair and benevolent arguments, addressed to the heart and the understanding, is a duty which men in society owe to each other, and to the cause of wisdom and truth.

In general the rise of rents has been considered by the owners as a stimulus to industry:—in many instances it has doubtless been found so; and the experiment has answered, without a national disadvantage. In others, the too high rent, when found by experience to be insupportable, has operated as an inducement to tenants to become desperate, and under a short lease, or none at all, to draw out the virtue of the soil by immoderate cropping, and then leave it to the consequent loss and great embarrassment of the owner; or, under long leases, to do the same thing, in order, by inducing a compromise, to get exonerated from their burden.

Such

Such natural consequences of high rent will of course operate as a check on the supposed evil; but as the nation must suffer by all the intervening damage and impediment, it is a subject which requires close animadversion, founded on increase of knowledge, drawn from mature and extensive surveys of national facts.\*

It is fair to conclude, that few instances of connecting small farms into large have occurred, under an apprehension that the general produce would be lessened; and many respectable advocates for large farms are not wanting to contend, that the quantum of produce is not on the whole diminished. But the proof of the position must be allowed by its strongest advocates to be rather conjectural than demonstrable; and the practice is deservedly unpopular.—Some respect will doubtless be considered as due to popular prejudice, especially in a critical period; and it is hoped by

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\* The writer, who in these remarks alludes as well to facts which he has seen, as to those reported to him by other persons, was forcibly struck in one of his last journeys in a southern county, with an instance of disadvantage to the landlord and the country, from an extensive farm being in the hands of an adventurous half-bred farmer at a high rent, or at a rent too high for the degree of improvement the farm seemed to have previously received. This man, unskilled and improvident, was beggaring the soil by random experiments on a large scale, and a most slovenly course of management. His character, as a master, so bad that men would not work for him if they could find employ any where else. Broken carts, wheels, and implements, were lying about under his hedges, as for ornament; and by report of his neighbours, the bailiffs were then in his house. He had a lease of a bargain he was unable to manage, perhaps just long enough to ruin himself, and half ruin the farm. Now had the same farm been divided and let, after a little improvement, to two real farmers, even for more money—or, on an encouraging lease, to one really good farmer with sufficient capital, at the same rent, how widely different would have been the prospect!

numerous

numerous persons, both of this society and among well-wishers to the publick tranquillity in general, that gentlemen, who are primarily interested in the question, will become more disposed than they may have been, to pause upon the practice, rather than hastily extend it.

The happy effect of more general *inclosure* is particularly looked to, and earnestly hoped for; and however new inclosure of untilled and neglected lands shall happen, whether under the provisions of a general bill, which hitherto has been solicited in vain, or progressively by more moderated expences of particular bills, it seems the general wish, founded on laudable patriotism, that this grand object may be realized. Advocate, and warmly such, as the writer of this article is, in common with numerous well-wishers to their country, for a greater proportion of small farms, he is convinced that more judgment is requisite than has often been supposed in the allotment of such farms; for if only the quantum of acres were to be attended to, such allotments, especially of arable, would be often injurious. If, for instance, due regard be not paid to the nature of the *soil*, but a small farm should be fixed in a very strong and tenacious one, the small farmer must be under peculiar disadvantage: for in order to plough and harrow his ground, he must keep a team equal in strength to that of a much larger farmer—to that of a man who has double, perhaps treble, his number of acres; this would be an expence wholly disproportioned to the possible profits of his farm; and supposing he paid no more rent per acre than a large farmer commonly does, would keep him in slavish and painful penury, if he could even live. And if such a farm should be situated, as many large ones are, at a great distance from a good market-town, his disadvantage would be double, on account of the expence of carrying his produce to market, especially small articles,

articles, as a little butter, a few fowls of different kinds, eggs, &c.—articles, by the constant furnishing of which, this kind of farmer is expected to keep down the general prices, and at the same time to get a comfortable living for himself and family. The situation most proper for such a farmer would be in a light soil, easily turned with a light plough by a pair of oxen, or two cheap horses, and in the neighbourhood of a market-town, with which he could have easy intercourse for vending his productions, and for bringing back manure, of which, from the smallness of his means and the stock of cattle he keeps, he would often stand in need; for such a small farm, managed to best account, should in fact be considered and treated as a large garden. To cultivate in this manner such small farms, would be mutually advantageous to the cultivator and to the neighbouring town, by keeping the latter continually clear of unwholesome effluvia, from neglected dunghills, drains, and stagnant places. In such situations, the small arable farmer, occupying from 50 to 100 acres, if cleanly and industrious, will always be found a most respectable and useful member of society.

Small *grazing* and *dairy* farms may also be considered as most advantageously placed in similar situations. The top-dressing, to be easily procured from towns, would contribute equally to the productiveness of pasture. And perhaps it may be held as a general rule, that arable or mixed farms, if usefully *very large* at all, should be extended in size nearly in proportion to the distance from large towns and cities. Some particular circumstances, of a local nature, may furnish exceptions to this general rule; but a sound general rule is not rendered the less important by necessary exceptions.

If the quantity of grain and butchers' meat, produced on such an altered system of division, may not be expected to

be *more* than on that of the present proportion of large farms, (which, however, must not be granted as a fact); there seems to be no good reason for expecting it to be *less*. Farmers are not in general found to be studious of turning each foot of their ground to the most profitable purpose, in proportion to the *largeness* of the quantity they hold;—they are not in general *cleanly* in that proportion;—their scale of farming is not considered as equally favourable with a small one, to the *excellence* of the *drill-husbandry*, by which a large proportion of seed is saved. And it is most certain, that from situation, as above pointed out, and the power of minute attention, the marketable produce, which the small drilling farmer will furnish, ought to be, for his number of acres, more in quantity than the large farmer can; and will be more various in useful articles than that farmer will think it worth his while to produce; consequently the opinion seems a fair one, that the publick would be *better* and more *variously* supplied. And while such a varied supply of the smaller articles of necessity may thus be expected from the small farmer, as eggs, fowls, butter, new cheese, small pork, a part of our veal, lamb, and mutton, with the addition of field-peas, turnips, potatoes, &c.; we may with equal propriety look to our larger and more distant farms for our chief supply of corn, fat mutton, bacon, and beeves. Those more abundant and expensive articles are most compatible with the capitals employed on a large scale of farming, at greater distances from the publick markets, and chief places of consumption. Indeed to experience itself we may safely appeal. And though the class of small farmers, especially those having families, may not, and they most likely will not, generally get rich; they will form a most useful link in the chain between opulence and poverty, and exhibit the most valuable and beneficial examples of active industry.

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In another point of view, i. e. in the *political*, to which we have already alluded, this class of Britons, if happily they should become increased, will be most important in their districts. No man attaches himself more strongly to his home, and the civil compact of his country, than he who has an important little at stake, and that little in close connexion with the soil he occupies! One grand security against foreign invasion, and even domestick tumult, is ever found in the known attachment of the hardy country inhabitants to their government. Make this class as numerous as you can; and give them a fair interest in something really their own to defend, and you establish the soundest, broadest basis of national security!

The reverse of this picture has been of late frequently alluded to, in the unhappy situation of a sister country. Without attempting to account for that lamented state of anarchy, which every one sees to have been largely fo-mented by bad men, the common opinion has been, and doubtless with too much reason, that the unwise and im-provident division of lands to the tenantry has unhappily favoured the atrocious attempts to excite general revolt and rebellion among the lower classes. Every reflecting mem-ber, not only of this Society, (in which they abound) but in civil society at large, has poignantly regretted the com-motions which have afflicted and deeply endangered that country. Various may have been the causes; but had there been in Ireland a large proportion of well-instructed small'farmers, privileged by renting immediately under the landlord himself, on equal and encouraging terms; and that landlord mostly dwelling at his country mansion, taking a kind and paternal part in their improvements and prosperity, Ire-land would doubtless have been in a different disposition.—  
No man will attempt to persuade us, that if, instead of the

general and unpopular practice of suffering a monopoly of land, and rack-renting at *second* or *third* hand small farming-plots and potatoe-ground, the mass of the country people of Ireland, ignorant and comparatively rash as they may be, would have acted as they have done. No; had their subsistence and tranquillity been more happily taken under the patronage of their chief landlords—Had the cottagers within each district been considered as the general objects of *their* benevolent attention; their minds prudently enlightened and fixed by the influence of *their* superior intercourse; the labouring classes of Irishmen would not have listened to the lure of French fraternity, of which the best informed had the sagacity to be jealous!—As this last topic has been often mentioned by some of the most useful members of this Society, and strongly illustrates the general subject; it cannot be improperly introduced in this place; because, though the Bath and West of England Society may be reckoned among *local* establishments, its views of improvement are not confined to narrow limits. Its solicitude for a *general* extension of useful knowledge has been long known; its volumes have been extensively read; its records of experiments and opinions have been respected. And under the present auspicious prospect of a more intimate union with *Ireland*, the welfare of that country becomes an object of proportionate concern to every benevolent British bosom. The conciliating, magnanimous language of an amnesty for excesses has repeatedly been held out, with invitations to returning order and tranquillity. The means, therefore, of securing and perpetuating the happy change, cannot but be highly interesting in the general system of happiness. As such, they can never be too closely reflected on, understood, and pursued.

Another source of discontent, and of which the disaffected availed themselves, may be usefully mentioned here, i.e. the

heavy burden of *tithes*. This was the more unhappy for the tranquillity of the country, as it is well known a very large majority of the population of Ireland were of the Roman Catholick persuasion.—They had their own priests to maintain; and the national system of tything, by which they were continually harrassed, and taxed in kind, in proportion to their industry, for the subsistence of another class of ministers, kept them constantly sore and indignant. This lamented grievance has been recently adverted to, by the wisdom of the British ministry; and it is not without reason that a timely regulation in this matter is looked to as a source of future tranquillity, that may be productive of the happiest effects, in that late agitated part of the British dominions. Of such hopes frequent mention is made by the friends of agriculture, peace, and prosperity.

The existence of the burden of tithes, in its present mode, is continually regretted, not only as it respects Ireland, but wherever agriculture is to flourish; but it is hoped, that so long as the wisdom of the legislature shall refrain from *alteration*, the chief landlords, both here and in Ireland, will see the great importance and utility of endeavouring, as generally as they can, to effect parochial or other extensive periodical compromises for tithes, to the end that lands, to the *smallest* farmers and cottagers especially, may be let *tithe-free*. And it is presumed, the many melancholy proofs which have been given to the Protestant Irish Clergy of the unhappy resentment against them, or the old system, will induce them to concur freely and fairly in such a plan. The more of this kind of amicable accommodation can be effected, in favour of small farmers and cottagers of this country, the better—both for land-owners, tenants, and claimants. For though irreligion may enjoy the ridicule frequently arising out of clerical claims for small tithes, the theme

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is very unpleasant; and, considered as a national check on produce, still more serious.

The situation of the poor cottagers of this country, and that of the miserable inhabitants of huts in Ireland, may doubtless be considered as very different, and that the balance of disadvantage is against the poor of the sister country. The circumstance of not having any distinct valuable property to value, but on the contrary a precarious subsistence in poverty, will always operate unfavourably to internal peace, wherever the sound of property and its importance shall be heard. It is impossible to give every man in the country an establishment as a master, and a large proportion will ever be found, who will not covet the care and the responsibility—will not extend their views beyond regular labour, a cottage, and an ample garden. This station, in the due order of civil society, has its sufficiently-attractive privileges. But gradation of rank is the beauty of domestick life, the bulwark of domestick peace; and while emulation of genius is natural to man, even in the rural departments of society, scope should be ever provided for its exertions, by the most easy and imperceptible steps of ascendancy.

Those who are acquainted with the present state of *Wales*, know well, that though the size of farms be considerably increased of late years, the warm attachment of the multitude to their native soil arises from their having yet abundant cause of such attachment, on account of the numerous small convenient tenements, into which the country is divided; and in comparison of which, the merely possible improvements of condition by *revolution* are considered, as they ought to be, but as dust in the balance. Hence, when the French landed at Fishguard, the unanimity of the numerous little farmers, their wives and children, urged them in defiance to the shore, almost without a single instance of disaffection;

disaffection; and this prominent feature of fidelity at once put an end to the invasion, nearly without bloodshed!—May this trait in the character of ancient Britons, be ominous of a general and lasting disposition through the whole of an united country, possessing within itself so many natural means of happiness, and dignified independence!

If that attachment be so strong in a part of the country where superior farming, and consequently wealth from farming, are rarely known—how much stronger may we expect them to be in districts where the system of management is better, and the opportunities of advantage, by proper exertion, so much superior! The most certain and expeditious way of strengthening the government of a country, is to multiply (and this can never be too often repeated) the number of inhabitants who have personal property in its soil! The steady, sturdy example of one small industrious farmer, sanctioned in his industry by a kind landlord, will over-awe half-a-dozen dissolute journeymen and disorderly mechanicks; while a numerous peasantry, rendered happy in their cottages, connected with a little garden, orchard, and potatoe-ground, may be made their examples in sobriety and due subordination. And to such an influential picture of content and quietude, the large master-manufacturer may be beholden for much improved morality and decency among those dependent on his employment. For in a commercial country, where the sources of employment must fluctuate, the best security for the quiet of the lowest ranks must be founded in habits of economy and orderly living.

Thus much on the subjects last-mentioned, it is hoped, will not be considered as improperly introduced in this dissertation; for however unsuitable it might be to render works of this kind the vehicles of *political* discussion, no friend of his country will deny, that the most important

principles

principles of political economy are intimately connected with the landed interest of the state. The more such topics are considered, the better they will be understood; and the more the publick mind is enlightened on these essential subjects, the better will individuals, who have the power of acting spontaneously, be qualified to discharge their publick and private duties, as members of the commonwealth. The larger the aggregate is of such private political wisdom, the greater will its weight and importance be found, in aid of the general administration of government; the less will be necessarily committed to the hazard of publick speculation—the less to the possibilities, to which every period is liable—the uncertain and unstable theories of inexperienced statesmen.

A radical knowledge of the true principles of general plenty, population, and content, in the country districts through the nation, will best qualify country gentlemen to act in parliament with success; and to maintain that important dignity to which they have the most natural and proper right. Their language in the senate will assume a proportionate tone of rational authority, founded in knowledge and experience; and prove the grand counterpoise of mere academical and theoretic elocution. The confidence of the nation may, under such auspicious circumstances, be expected to rest, on a large scale, with such experienced men; and the happy increase of their number through the nation, would render the task infinitely more difficult than heretofore for adventurous persons, little known but in the circles of trading monopoly, and wealth, to supplant them in the important periods of parliamentary election:—a source of danger this to the real interests of a great agricultural, as well as trading, country, from which it is to be feared many disadvantages have long been felt to arise, without the means of an adequate remedy!—But to return to observations

tions more immediately within the views of a Society chiefly agricultural.

A principal object which has continued to engage the Society's attention, has been the important one of improving the general skill in *live stock*. This is an object confessedly of great national consequence. And it cannot but afford much pleasure, and a most favourable presage of success, to see men of the first rank and influence turning their attention from the comparatively-barren amusements of the turf and of the chace, from unprofitable horses and dogs, to those animals destined for the aid of manufactures and the food of man. Of such men this Society may boast a considerable acquisition of numbers. It is now become a great rational question, *What race of neat cattle, sheep, and even swine, are to be considered, or by what degrees of admixture they may be made, the most profitable for a general supply of animal food?* This question proceeds on a supposition, now extensively received as a fact, that it is practicable to increase, in a considerable degree within the year, (and without materially lessening the quantity of grain for sale) the quantity of animal food, heretofore produced on the same land, and that food of *better quality*; or, in other words, *more valuable*, by lessening the coarser, and increasing the finer and more profitable, parts of the animals; also by selection and admixture in breeding, to increase the disposition to speedy fattering, and a speedy accretion of flesh and fat on those parts which are the most valuable for food, *by the pound weight*. The effect of these pursuits, it is evident, must be placed to the score of benevolence, in a considerable degree, inasmuch as it goes to promote the means of keeping down the price of animal food, and affording a better chance to the labouring classes of getting a little more nutritious meat, than they could be likely to do were such improvements

improvements neglected. And when the rapid progress of canals through the country is considered, by which œconomy it has been satisfactorily shewn, that a considerable lessening of the demand for horses will be made, and consequently of their consumption in corn and hay, beyond the proportion of lessened soil for the canal room; it is expected, the advantage of a larger supply of animal food will be gradually felt. At any rate it is to be hoped, that by those means the increased supply of such food will be found proportionate to the degree of population, in which, as aforesaid, the country is supposed to be augmenting.

From causes not accurately definable, it is indeed certain that a fluctuation in numbers will take place, from period to period; but in proportion, or in some general proportion, to the increase or decrease of manufactures, and the spirit of agriculture in any country. For mankind, prone to partial affection, and connubial endearment, (which chiefly suffer restraint from the difficulty of maintaining a family) will marry and augment in population, as the prospect of subsistence increases, and *vice versa*. In a country like this, largely engaged in manufactures and commerce, by means of maritime intercourse, the fluctuation must also be felt, in proportion to the circumstances and dispositions of other nations respecting her. Independent of such circumstances, her causes of fluctuation in numbers must depend on her internal exertions in the cultivation of her soil. An increased disposition to extended and improved cultivation will operate internally in favour of marriage, and increase of population, though more slowly than in connection with foreign commerce. And this internal cause of increase may be supposed to be capable of extension, as far as the power of improving the soil, and augmenting its produce, could be carried. A spirit of local industry increases the call for hands,

hands, and operates as a bounty on marriage. The consequent increase of numbers re-operates as a call for industry, and the produce of labour. Thus they might be mutually considered, to a certain degree, as cause and effect. And independent of exterior influences, the fluctuation would be the less, while the increase might be even and progressive, till it could proceed no farther, without recourse to emigration. The numerous thousands, however, of uncultivated acres in this country, and the resources of improved cultivation of land, may well convince, us that the period of necessary emigration, from redundancy of population, is not yet nearly arrived. In connection with our present extensive foreign commerce, foreign settlements, and foreign wars, which take out of the country so many thousands of people annually, the uncertainty of the continuance of such foreign drainage, the liability to numerous returns of natives, and the casualties attending a foreign supply of provisions, all taken together, seem to call on the present period for new and powerful exertions in cultivation.

To provide for the greatest scale of numbers, and of consequent want of sustenance, is an object of necessary exertion; and under that Supreme Providence which governs all things, those exertions may become powerful means of national strength and prosperity.\*

To proceed in our considerations on the improvement of cattle.—The species of animals, which is understood by the term *neat cattle*, is confessedly a noble and graceful ornament

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\* In the most important point of view in which these subjects can be considered, *i. e.* the moral, the serious observer of improving art and nature may indulge a hope, that if it be a *good* for a smaller number of inhabitants to live and be thankful for the means of comfortable sustenance, the combined object may in itself be amiable and worthy, in proportion to the extent to which it may be carried.

of our pasture-fields. The varieties arising from climate, situation, soil, and other less-known causes, are objects in themselves of curious observation and study. The varieties, and shades of difference, are almost infinite; the difference in strength, usefulness, and beauty, are no less remarkable; and the whole of the subject affords scope for continual reflection, skill in the preference, and ingenuity in the arrangement for propagation. All these are not only an allowable, but comparatively speaking, a worthy pursuit for the ingenuity of man, to whose care, and for whose service, the animal in question seems to have been particularly destined.

It is not wonderful, then, that in an age of curious enquiry and experiment men should be found devoting much of their attention to the improvement of this animal as a science. The progress, so far as it has gone, has rewarded both curiosity and cost. It must be obvious to reflection, that, though the standard of its beauty and perfection be not easily fixible in the general opinion, there are general principles attainable, by which comparative excellence may be usefully determined; and those principles seem to be growing towards maturity. There are some particular shapes and features of the animal which, at first view, seem to challenge a common consent, to the character of comely and beautiful. This distinction is the more speedily and fully discovered by those who, from the most constant habits of observation, are best acquainted with the hidden qualities commonly attendant on particular shapes and appearances; but most observers agree in soon pronouncing where beauty or deformity, symmetry or its opposite, remarkably appear.

In the variety of opinions, not yet reduced to a certain standard, it is not settled that the greatest disposition to the most profitable fattening, in neat cattle, is proportioned to what is generally considered as the most beautiful structure

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of the animal; particularly with regard to the mould of the body. But few will be found to doubt, that such a disposition is commonly connected with some characteristics of the general frame, (constituting what is commonly called *kindliness*;) as for instance, that the smaller and finer the head and neck, the finer and clearer the horn, the more lively the eye, the cleaner and more delicate the mouth and nose, the straiter the back, the deeper the body, the smaller the bone below the knee, the thinner and looser the skin, the finer the hair, &c. the greater is the probability of expeditious and profitable fattening.

That casual instances of such fattening may be found, where some of these characteristics are wanting, will not be denied; for there are, throughout nature, particular exceptions to general rules, which it may be difficult to account for on any generally-acknowledged principles; but if general rules be soundly established, (as we have before had occasion to remark) the casual exceptions furnish no solid arguments against their adoption. On the contrary, in proportion as general rules are found to be useful guides in the choices men are to make, the more important it becomes that they be carefully studied and regarded in practice. The strength of prejudice is great; and the operation of prejudice in favour of those animals which have long obtained in a district, is with difficulty overcome. Men of the same pursuits are commonly prone to hope, that they and their forefathers have not been deceived, or have not been blameable in their want of enquiry and their habits of reasoning; and it requires more openness to conviction, than men of moderate information are commonly capable of, to be ready to admit an erroneous judgment at the expence of their own pre-supposed knowledge. And too many are to be found, who apparently would rather

continue

continue to sustain and propagate a disadvantage, than take to themselves the supposed discredit of *inferior judgment* or *inferior success*, however consequent upon the mere accidental circumstances of their situation. But this untoward disposition among farmers, breeders, and graziers, is now happily lessening; and a spirit of more liberal enquiry and conduct seems to be extending through the nation.

For a breeder to possess correct notions of the sources of improvement, it is necessary to consider, where the most complete animals for his purpose are to be found, in a state of nature? Analogical reasoning may induce a general opinion in favour of finding those animals at home, natives of the climate, which may be most useful and profitable in that climate. The probability is, that they *will* be found there in the *most considerable* degree; although an opinion has been formed, as an exception to the general rule in some cases, and for some purposes; an opinion formed also by analogy, from the known improvement of our horses by admixture with the native races of Arabia. This advantage may be real with respect to *speed, strength in proportion to the size*, and as to *beauty*; but whether as to an increased disposition to mature and to fatten, (main points of importance in the improvement of neat cattle) is not so clear. That quickness of step, and strength in proportion to size, (both important for draught) may be imparted to the ox by such admixture, is little doubted where the experiment has been fairly tried. These advantages are supposed to have been ascertained by an admixture of the lighter, smaller-boned French, Norman, and Guernsey, with some of our own. But whether this production has been superior in those respects to the unmixed natives of our own southern and south-western counties on the coast, is yet considered by some as doubtful. Others strongly maintain the affirmative;

utive; and this is no small proof of the general excellence of both. To our own counties on the coasts, and perhaps preferably to those parts of the coasts last-mentioned, we may expect to resort for our own purest and most valuable breeds. Devon and Suffex present themselves for our approbation. The general similarity is striking; but some difference, as to coarseness about the head and neck, appears against the Suffex race.

In proportion as we recede towards the centre of the nation, we discover the effects of accidental mixture, in a vast variety of colour, size, and shape; of comparative beauty and clumsiness; difficult to be described. An almost equally heterogenous mixture may be discovered, as the produce of the interior parts of Scotland and Wales. Nor is this variety of deteriorated animals to be wondered at, when it is considered how inattentive, till of late years, have been the great majority of breeders to selection and improvement, in the propagation of neat cattle. The procuring of the number wanted in the shortest way should seem to have been the main object in view, till a more general intercourse of breeders, by means of improved roads, became favourable to comparative observation and knowledge. An attentive comparison of propagated deformity, with the less mixed and more beautiful droves from the clearer, warmer atmosphere of the south-western coast, could not fail to strike and suggest ideas of more careful management in the business of breeding. Thus we seem to have been indebted for new taste. From whatever local cause or causes it has arisen, the fact seems to be generally admitted in these western counties, that the county of Devon furnishes the most uniform and generally-valuable race of neat cattle for the most important uses, and particularly for the purposes of improving by mixture the stock of

interior

interior districts. Nearly similar may, perhaps, be the advantage of drawing aid from Sussex to districts nearer that county. Other kinds of admixture, for counties nearer approaching to *northern* and *eastern* shores, may possibly be deemed equally important to *them*. But this latter idea may be considered as more theoretical, and founded chiefly on the probability of less deterioration from chance admixture in new situations.

The partialities of the inhabitants of different districts to those animals they are most acquainted with, and which they can most easily procure, are not unnatural; and while those partialities are connected with a growing care to select for breeding the fairest and finest individuals of the different races and mixtures, the general advantage of improvement might be going on, though with unequal success. An *uniform progress* must not be expected; and the standard of *perfection* will never be fixed. There is, however, one great scene of comparison and instruction to which breeders cannot be too attentive, for storing their minds with the principles of this sort of knowledge, and that is—*the London market*. There they will find, weekly, the most varied assemblage of shape and peculiarity, which any spot, perhaps, on the habitable globe can furnish. But if symmetry and general excellence are valuable at once to the breeder and consumer, there the inhabitants of the West of England may discover advantages in their own favour, which, however unworthy to be the subject of pride and exultation, may at least serve to satisfy them, that they have no need of resorting to distant British districts for improvement of neat cattle. There the Devonshire beasts, both oxen and females, and those of a mixture from that county, will bear the test of a close comparison with all others around them. The obvious fineness of bone and offal, and large quantity

of valuable flesh, in proportion to the weight of the whole animal, and in comparison with the far-greater part of the market, are conspicuous, and we may fairly presume, indisputable.

The extreme coarseness of a very large part of the beasts, sometimes brought to that vast market, may serve to convince an intelligent observer, that a wide field lies still open for improvement; however simple and obvious the principles are on which that improvement might have been long since carried to comparative perfection.

The continued zeal of the members of this Society, towards the attainment of such an object, gives some earnest that it *will* be attained. The publick ploughing-contests, particularly the last near Piper's-Inn, may be considered as fully proving the excellence of Devonshire oxen, and those mixed with French, for speedy and effectual labour; inasmuch, that their easy performances, on that occasion, have become discredited in other counties. And the expedition with which they fatten, after many years of profitable labour, and the superior price they will generally produce from the butcher, are undoubted proofs that the growing preference is well founded.

The French, or Norman, race, so generally heretofore prized for milkiness, gentleness, and hardiness of living, will not fail to grow in esteem, for refining and bringing back to a better quality all coarse and mongrel stock, with which they shall be mixed. And the stature to which oxen of this race will grow on *moderate*, but especially on *good*, keep,\* is an answer to any objection raised against the dimi-

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\* This fact has been fully exemplified, under the care of Mr. DAVIS, in the park of the Marquis of BATH, at Longleat, and may be frequently confirmed by observation in Smithfield market.

native size of the cows. But however some western gentlemen and breeding farmers may withhold their assent from the advantages hereby held out, (and some such exceptions are to be expected) one principle must be contended for, in the concurrent language of experience and skill in this Society, *That no offspring, if it can be avoided, should be raised to maturity but from the finest-boned, cleanest-headed, and best-fleshed of every stock, both male and female.* By a close adherence to this rule, the improvement that might be made, even among his own stock, by almost any breeder, in a few years would become striking, important, and influential. A close adherence to this principle of choice at home, and in occasional purchases at publick markets, will soon convince any man of common sense, how unnecessary it is for common farmers to give the enormous prices we have sometimes heard of, for chances of improvement in horned cattle!

### SHEEP.

Of this animal little remains to be said, in addition to the remarks which have been already made in former pages of the Society's publications. That no particular description of sheep is likely to be pronounced by the general voice as *best for all situations*, is clear; and the fact is confirmed by progressive experience, and the soundest reason. That the *Leicestershire*, or what are called by the sheep-breeders of that county *the new Leicestershire*, sort, is growing in estimation *for inclosures* is certain. And it must be noted with pleasure, that among the improvements of these breeders that of *wool* is said to be increasing. If by any happy crossing and care they can carry this object considerably further, without losing any valuable peculiarity of carcase for expeditious fatting and general consumption, they will render a further very material service to their country. Whoever looks

In the district of the Wiltshire flock another incident occurred, which gave rise to some enquiry and reflection. In an oat stubble (for so early as the 3d of August of this year, many oat and barley, as well as wheat, stubbles were to be seen) a large number of swine, chiefly breeding-sows and litters of half-grown pigs, appeared; they were kept by two little swineherds. Curiosity was excited to close inspection. The stock belonged to a neighbouring gentleman, who, it seemed, had chosen this branch of breeding and fattening. The number, which was pretty large, afforded a considerable variety of kind and shape. A more heterogeneous mixture will be seldom seen in a breeder's possession. The variety was most remarkable among the sows. The principal boar was a mixture from the Chinese breed—handsome in the body and limbs, but unnaturally long and coarse in the head. On the whole, he seemed to have greatly suffered in shape from injudicious admixture. The offspring generally partook of his figure, in the least agreeable particularities. Useful as this kind of animal is to this country, and most others, in different parts of the world, perhaps none has received in England less critical attention from professed breeders. The less reason can be assigned for this neglect, because no animal may be considered as having fewer points of profit attaching to it, beyond the speedy growth and maturity of the carcase. The covering of coat and skin are chiefly of very small consequence to manufactures. The quantity or coarseness of bone and offal are objects which will be deemed of no less consequence than in other animals; at least in proportion to the general value. Hence it should seem, that a very simple process of reasoning would fix the perfection of this animal to the quickness of its growth to maturity, and its greatest proportion of the most valuable parts of the carcase. And these

these objects will be easily allowed to attach to the smallest, most compact, and small-boned bodies. The Chinese race, or that mixed with one of our own smallest and most suitable varieties—or rather with individuals of such descriptions, which may be *selected for the purpose*, and the produce afterwards kept distinct in propagation, seems to be the simple plan for excellence in this business.—When it is considered that the smaller animals are certainly not less prolific, and sooner come to the period of breeding than large ones—that they will subsist on shorter food, get speedily into good case, where large ones will look lean; fat sooner, and when killed, yield meat more fine for general consumption, as pork, or as small bacon; that none excel them in flavour; one should think the balance in favour of the careful propagation of such a race, by such a breeder as we have alluded to, would have been almost certain;—that it was next to impossible for an educated man of fortune to engage on such a scale of breeding, with ideas so incorrect! At any rate, the chancé-medly system, while it betrays want of reflection, useful taste, and the proper spirit of example, is certainly to be blamed. We have often heard of large swine-breeders, for the purpose of general experiment as to profit, when compared with other kinds of stock; but we have seen too little of *discrimination* and *system* in swine-breeding itself; as though this animal, which, from its aforesaid quickness of propagation, and the different convertible uses of its flesh, is, perhaps, (like the potatoe among vegetables) of more real consequence to the bulk of the nation than any other, were to be the last to receive improvement. The gentleman in question, however, more certainly than the farmer with the Wiltshire flock, we may still pronounce *useful to society on a wrong principle*; and if he has perseverance enough to continue long in negligence and error, we will hope

viduals appear, which are at once preferable in both points of view, (not only a possible but a common case) care should be taken to preserve them, whether male or female, for propagation. This care would soon produce great improvement. Publick comparison for small prizes would establish characteristic excellences, diffuse emulation, furnish a market for whatever excellence might be otherwise destroyed, and perpetuate the useful strife.

On this topic of *selection* for breeding, admonition cannot well be too urgent. For the disadvantage arising from the neglect of it is one of the greatest in the mismanagements of a flock; and than such neglect, in common practice, nothing has been more frequent. By that kind of attention which is sometimes paid to selection, we occasionally see respectable farmers bring their flocks to great uniformity of size, and in some of the longer-legged races and mixtures to a gigantic stature; as though all excellence consisted in the largeness and bold appearance of the animal; bearing a prodigious pair of horns upon a large head, and standing on legs of equal coarseness! The fleece, if regarded at all, is regarded with small attention to the fineness of the pile, and elastic quality for clothing manufacture. The reverse of this conduct would be attended with no extraordinary trouble: true critical attention might be easily paid—habit would render it familiar and delightful—the advantage in ultimate profit would be certain.

It is natural for a man to be attached to a flock of his own breeding, and a kind to which perhaps his ancestors had been accustomed; a total change is a serious thing; and such a change should never be lightly resolved on, or without a fair comparative experiment, on a sufficient scale, against the old race of sheep. But obstinate incredulity is the enemy of *all* improvement. And here, on the subject

of

of change of sheep, the writer must not omit an instance of attachment and perseverance which he last summer had occasion to remark, in a journey from London to Lewes.

One of the first objects of sheep-stock which occurred, in the stage from Croydon, was a flock of *large* sheep at a distance. On approaching them for examination, and to converse with the shepherd, they were found to be a flock of Wiltshires. Surprised to find *them* within boundaries supposed to have been almost sacred to the South-Down, the writer made the shepherd explain, as well as he could, the reason of the choice. He said, his master was almost the only man in the neighbourhood who continued to keep this kind of stock; but he believed his master was afraid to alter, lest another sort should not answer; he having been used to keep a fatting and lean flock of these wethers for many years. That when bought and sent him at Michaelmas, they generally, as he understood, cost about one guinea per head; what they fetched, when sold off fat, he was not quite certain of, but thought the most common price was about two guineas per head.\* However, the shepherd proceeded voluntarily to remark, that the lean stock of this race were certainly too large for his master's keep; they strolled partly on the waste and partly on inclosures in the day, and were folded on the fallows at night; but kept themselves thin and poor in this course. That all the neighbouring farmers kept South-Down flocks, which they reckoned did better, because they kept themselves in better order on the same kind of land and the same food. The account was in substance what one should expect to hear,

\* These prices must be supposed to vary with seasons; and practical judges know, that to fix, or suppose, an average value of live stock, on any given number of years, is not easy.

and

and which was really heard without regret, or disposition to blame, for his great caution, the honest persevering farmer.

We must hazard, before we leave him, an opinion, that though he may possibly gain less than some of his neighbours for a few years, he is, if no sluggard, one of the most useful men of the district. He keeps up a standard by which many others may prove the value of their experiments, and without whose caution and steadiness more doubtful conclusions may be drawn; while the *lateness* of his conviction, if a little wrong in itself with regard to *him*, may operate at last the more powerfully in his favour, or that of his successor on the same spot. Let no man, therefore, sneer at or triumph over him, on account of his own early success; but rather respect him for his aid, in the most certain establishment of important facts.

These reflections will not be considered as suggesting an idea, that the growing opinion of general advantage from a wider introduction of the South-Down breed of sheep is erroneous; on the contrary, we need not doubt but that the growing alteration is defensible, and will be found an improvement to a very considerable extent.

Time and observation will shew how far *district* and *local circumstances* will affect the continuance of those characteristics, which are now supposed to belong to the race of animals in question. The natural bounds (if there be such) of preservation as to *shape*, *size*, and *wool*, may ever be difficult to ascertain—and long stages of observation may elapse, from the present degree of knowledge, before the idea, now speculative, may become verified, whether any supposed peculiar race of sheep, or other useful animals, will, or will not, materially change by *continued propagation* in a new situation?—If the fact be, that original differences were naturally produced by peculiarities of various districts, it will,

will, perhaps, not be doubted, that any considerable remove of any particular description of sheep, will be unfavourable to the perfect continuance of their characteristics. But these reflections, however well-founded, may furnish no just reason against real advantages of frequent removals and trials of those races, said to be found, on the whole, the most profitable.

### SWINE.

Another branch of practical improvement in live stock, though not the most elegant, may be considered, in some points of view, as little inferior to the two foregoing, i.e. *swine*. The importance of this article has long been acknowledged, by its general use in victualling the people of numerous countries, ancient and modern. What may have been the degrees of attention paid to the choice or improvement of swine in other countries, or by our ancestors in this, may be a subject not easily settled, were the enquiry of more importance. But from some causes, connected perhaps with the natural indelicacy, and unpleasant effluvia of the animal, it has been less esteemed as an article of live stock, than from its importance it deserves; and, comparatively, few farmers (who are most commonly the breeders) have been known to pay much attention to its selection and improved shape. That negligence, however, has of late given place to considerable care and judgment in many of our modern improvers of stock. And never did a neglected animal promise fairer to reward such attention.

Whether we consider bacon and pork as substantial articles of food generally relished when well cured, or as articles which may most expeditiously be brought in aid of a country, in a time of scarcity, the hog is of incalculable value. The vast variety of refuse liquid, and of vegetable substances,

too

too frequently wasted, by which this animal may be partly sustained, in numerous situations as well as in farm-yards, besides the value of its manure for gardens, orchards, and farms, are better known than regarded. And few are the country cottagers, having the benefit of a garden, or even tradesmen in towns, who have any considerable back-ground, but may constantly sustain one or more pigs, and easily bring them to a size for pork, at small expence. But much of this convenience will depend on the *kind* of swine which shall be generally propagated for sale—and something on the exposure and construction, for drainage and cleanliness, of the fleshes in which they are kept. Proverbial as is the dirtiness of swine, perhaps few animals will better pay for a little attention in a confined state, by a constant draining away of their dung and water. These last observations, indeed, are chiefly applicable to swine of a sufficient age to be confined for pork or small bacon. For porkers, the farmer, who thinks it worth his while to cultivate this kind of stock, has particular advantages of yard-room, in which they may range at large without further confinement than convenient boundaries around his house. And the expedition with which a litter of pigs, of a natural small size, will grow almost sufficiently fat in the open air, and on the common produce of the farm-house and garden, aided by a little refuse corn, is truly encouraging.

This humble animal appears to furnish an exception to the general theory before-mentioned, that *those articles most advantageous in any climate may be expected to be found as the natives of that climate.* For however valuable our *native* swine may be rendered by careful selection, it is no uncommon preference which is now given, either to the genuine Chinese race, or a mixture of that race with some of the smallest and most compact of our own.—Certain it is, that

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the Chinese race come soonest to maturity, propagate fastest, and for porkers are a very delicate and valuable article of stock. Their faculty of propagation, if closely encouraged, is extremely rapid. And their power of living and thriving on grafts, clover, and other green vegetables, is most remarkable. Their diminutive size, indeed, renders them objects of only partial estimation; but this is easily corrected by admixture. And to such breeders as regard properly the utility of swine, this produce is not the least amusive among the articles of breeding-stock.

The frequent killing of roasting-pigs, at three or four weeks old, may be reckoned among the most exceptionable luxuries of the epicure; especially in a country where so many thousands of poor are often constrained to live, for a long time together, without a taste of animal food. They might be far better accommodated by a more vigorous attention to the raising and propagation of pork, by means of these fast-growing and excellent little animals.—But, if delicacies are to be studied, it requires but little conformity of the palate to relish the *joints* of such small porkers, as little, if at all, inferior to roasting-pigs taken from the teat. Indeed, one might reasonably consider the larger food as the most removed from indelicacy of eating; certainly it is the most nutritious.

Large bacon, and the substantial ham, the produce of breeds on a larger scale, will be called for, and of course they will be sufficiently supplied by those who continue their preference to the large breeds of hogs; but the excellent samples of middle-sized fat and store swine, partly a mixture with the Chinese, which were produced at this Society's Annual Meeting of the last year, furnished not only the strongest evidence of the value of such a mixture, but the most full recommendation of such a beautifully-compact breed

breed to all gentlemen, farmers, and others, who think *any* useful preference in swine not below their notice.

Considered in a national point of view, such improvements, and an ample supply of the pig-market, are of the first consequence. For many months together, when beef and mutton were at an enormous price, too high to admit of poor, and even middling, families affording to eat them, pork and bacon, from a seasonable exertion of the breeders, were at so moderate a price, as to make the scarcity of other articles but little felt. In some of our markets good pork was to be purchased at little more than half the price per pound than the best beef and mutton were sold at. And here it must not be deemed an arrogant claim, which the Bath and West of England Society may make, to seasonable usefulness in this matter. In the year 1796, it will be recollectcd, how great was the alarm through the country of an apprehended more general scarcity than was even then felt. The most strenuous exertions for the production of *potatoes*, and the most speedy increase of the number of *pigs*, were considered as the most obvious means, under Providential blessing, of obviating the threatened difficulty. The latter exertion especially was recommended to the country in a pressing paragraph, drawn up at the instance of some of our most active and provident members, and circulated through almost all the newspapers of the nation. This paragraph called on all persons who possessed a sow capable of speedy breeding, to embrace that mode of contributing a share of the general supply. The consequence was, *the most seasonable and expeditious aid*. The benefit of the happy general exertion was soon felt, to the comfort, and, perhaps, in a large degree to the quiet, of the country. And this is the more remarkable, when the vast consumption, and necessary waste, of furnishing large navies, and armies encamped, are considered.

On

On a subject of such national consequence, every useful argument should be thrown out by those whose professed province it is to keep the nation attentive to the great business of home supply, and especially at a time when so much uncertainty rests on the practicability of a future foreign one. The present times are new and awful. And if the bountiful Author of all plenty has not so great a controversy with this nation as to render human exertions vain, we may humbly hope, that, by continued attention to the easy object before us, our supply of nutritious food may be secured; but the *means* must be employed. Beef and mutton are again become uncommonly dear; the prices may still advance—for the late severity of the lambing season may have been destructive to more than the common proportion. Should this prove to be the case, the effect will be felt through another year. To numerous gentlemen who will read this book, the reiterated exertions of small pig-breeding may yet be seasonable and most useful. If the object be worthy at all, attention to the *kind* of produce cannot be a matter of indifference. Not only the smallest come soonest to perfection, or to an useful growth, but will make the greatest proof on steamed potatoes, and other vegetable substances, with the least necessary proportion of corn.—Gentlemen will not fail to find amusement, as well as profit, in this humble species of breeding, in proportion to the care they take in selecting their sort—avoiding the long, coarse, large-eared, large-boned, and unshapely animals, which in many places still too much abound, merely from negligence and want of discrimination.

A remarkable instance of this inattention, as it occurred to the writer of these remarks in his aforesaid journey towards Lewes last summer, may not be improperly set down here, from minutes and reflections then made.

In

looks over the largest Smithfield marker, will see abundant evidence of the estimation in which the new Leicestershire carcase is held; and though when fatted to the enormous degree in which it has been exhibited at Bath, the meat ceases to be a delicate article, either to the sight or taste—the new Leicestershire mutton moderately fatted, as it should be, is undoubtedly a good article for the nation. It has been a matter of frequent enquiry, What can be the motive for laying on such a quantity of fat, as the Society has been frequently treated with the sight of?—It has been as frequently said by persons enquiring for the reason, that utility does not appear in this matter—for such a quantity of fat cannot be eaten *fresh*, and if *salted*, such mutton is far inferior to *bacon*, if not more *costly*.\* The answer commonly suggested has been, that the scheme was doubtless intended to shew, to what degree of fatness such sheep were capable of being fed. This has still been unsatisfactory, because it has been readily supposed, that almost every other race of sheep may be made equally fat, on pastures and food adapted to fat them—and some in company with Leicesters. The better objects would be to shew by example, What is the degree of fatness most proper for any sheep for general consumption; and how soon, on a given kind of common food, the animal may be expected to attain that useful degree of fatness?

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\* Some strong advocates for this kind of stock have doubted, or seem to doubt, whether pig-meat can be rendered cheaper than mutton. The vast difference in the article of *fecundity* is, however, so far forth, in favour of swine; the expence of fattening, per pound weight, is another branch of the question less easily determinable; and *wool* is an object of great collateral consequence. But considered apart from this last article, it would most likely be found, that swine, of a good edible size, may be rendered cheapest by weight.

The South-Down race, at once for inclosures and for down-walks, are growing in repute after progressive trial. The superior quality of the wool of this latter race, added to that of the mutton, will not fail to ensure a continuance of the estimation in which they are held, in a large part of South-Britain. The increasing zeal of the Sussex farmers for improving, by selection and care, their native and invaluable breed of sheep, cannot be too much applauded. This spirit was displayed on a large scale, in the most liberal manner, at the summer exhibition at Lewes in 1798—a spectacle which the Secretary of this Society thought it a part of his publick duty to witness; and it is with pleasure he can bear testimony to the fair and exemplary manner in which the exhibition was made. To see thirty or forty farmers bring forth each ten picked ewes of the same age from his flock, and place them in open pens side by side in a long rank, for the whole country to compare and improve by, while the premiums seemed to be an inferior object; and at the same time exhibiting for premiums and sale some of the finest rams in the country, was no common occurrence. The landlords and chief gentlemen of the district mingling with those farmers, encouraging their tenants in their useful emulation, and taking a part with them in the rural and peaceful contest, were circumstances of additional pleasure.

It is not possible for the sheep-owners of every great district to exhibit in like manner and to equal effect, for few are the races that can vie with the South-Down; but every race is capable of *some improvement*, by care in the selection for breeding stock; and without such care will fail of that improvement, if not degenerate. No flock is found without shewing some difference in goodness of shape, and perhaps a considerable one in wool. And whenever *individual*

hope that dozens of his neighbours, and many casual observers by the way-side, shall profit by his bad example.

**MART for CATTLE, &c.**

The better to bring under publick notice, and to promote the sale and diffusion of valuable stock, this Society has judged it useful to institute, on the day following the Annual Meeting in Bath, a *Mart* for such sale; and to invite the attention of spirited members of the Society, and the publick at large to this object.—The Mayor and Corporation of the city, having been consulted on the occasion, replied by the fullest approbation and concurrence; and it remains to be seen, how far, under such united patronage, the publick improvement shall be benefited.—It is not intended to encourage an exposure of cattle of all kinds and qualities—that would not answer the main views of the Society; but chiefly those, whether neat cattle, sheep, horses, or swine, which have either real or supposed excellence, in their several shapes and qualities to recommend them. It is considered that a supposition of excellence may be attached to some animals of small value; but if the exhibition be made from that motive, however erroneous, the contrast that may be formed by placing such samples by the side of more perfect and beautiful ones, and before the best judges, may answer an important end, by rectifying errors of opinion, and improving the general judgment.—The season of the year is favourable to a large consumption of fat animals of various kinds at Bath, and consequently to the obtaining of fair prices. The numerous company of gentlemen, and capital farmers, then commonly in town, will most likely render the risque very small indeed, of having to drive back, for want of sale, any lean stock, that may be particularly excellent in its kind.

WOOL.

## WOOL.

The progress of particular branches of our woollen manufactures, and the particular state of European politicks, have lately contributed to raise the price of Spanish wool to an uncommon height, proportioned to the difficulty of importation. This gradual effect has at length alarmed the fine broad-cloth manufacturers, and apparently so the *Board of Agriculture*. Much is due to the timely exertions of all publick bodies, actuated by patriotism, and moving with discretion; especially in critical times; and if their exertions should even fail of the success they aim at, the motive is good, and will directly or indirectly produce some good effects. The publick mind must on many occasions be stimulated, before it will seek expedients, or understand the power of devising them; and no effort, on the great whole, can be useless in the field of knowledge.

Any effort to supply, from native produce, the place of a foreign import, in so great an article of consumption as wool, *may* prove ineffectual; and, on our present scale of manufacture and trade, most likely will do so. It may be found impossible to supply all our looms and merchants from our own flocks, however improved—however attempted to be multiplied; but though *multiplication* cannot be pushed beyond natural bounds—*improvement* of our flocks, by that selection and admixture which have been already dwelt on, may go far. Just as far as it can be carried wisely, it is our duty to carry it. And though the system of driving our flocks over the hills of extensive districts, to counteract varieties of atmosphere, cannot be realized here as in Spain; we may by selection, by crossing, by cotting in winter, &c. gradually add a much larger number of fine fleeces than the difference between “300,000

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and 500,000<sup>112</sup> annually. And, perhaps, much more than this may be done, with some national advantage too, as to the carcase, without materially trenching on the supply of different kinds of wool wanted for the various *other* woollen manufactures of the kingdom; the loss of *any* of which must be guarded against.—But if, after all, there be found existing positive reasons why we *shall* want a foreign import of this raw material, those positive reasons need not seriously alarm us. Our tried and known ability to purchase and pay, so long as that ability lasts, (and it will last as long as foreign demand for our broad-cloth) will always secure us a preference, directly or indirectly, in foreign markets. Any exception to this rule must be temporary, and will most likely be gradually rectified, when it shall occur; for even a scarcity will soon be followed by a reflux and abatement in the market, as in the cases of most other marketable articles. In the mean time there can be no doubt, but that for home consumption the quantity of English wool, so far as it can be spared for making best cloth, may be rendered sufficiently fine for all the purposes of warmth and decency. These considerations may serve to set the minds of Englishmen much at ease respecting apprehensions of any *permanent* difficulty, or advance in the price of woollen clothing. Corn, fruits, and fat and lean animals vary in price, according to the general demand, and the quantity on the market. So also cotton, hemp, flax, silk, *wool*, &c. and we have small reason to apprehend, from the present state of Europe and its manufactures, that this country is in danger of suffering any material *prohibition or rivalship*.

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\* See the speech of Lord SOMERVILLE to the Board of Agriculture, March 14, 1799.

These considerations are judged seasonable, by way of balance to the otherwise gloomy idea, that our power of home supply is unequal to all our demands for wool; and that it *must* be unequal seems clear, from various points of calculation. For if it be true, as has been stated, that in 1797 were imported into this country more than 30,000 packs, each about 2 cwt. or 6,720,000 lbs. of Spanish wool; that in a time of peace an average import of 25,000 packs, or 5,600,000, may, according to former averages, be required; and that, reckoning 3 lb. to the fleece, 1,866,666 additional sheep in this country would be required to supply the demand, we could not expect to augment our stock of sheep in that proportion, without changing the taste of the inhabitants very largely from other articles to mutton, as food. And could we even do that, the large decrease of the number of beeves and calves must alarmingly decrease the home supply of neat skins for *leather*; the different kinds of which have already advanced far more in price than wool has done. Nor is leather so little important, but that a proportionable increase of imported skins *must be bad*, under all the expensive difficulties that may possibly attend it;—perhaps greater at some future time than the import of wool itself.

Respecting English wool, (undoubtedly a very important article) a general complaint exists, that the growers of improved fleeces are now unable to procure from the buyers a price for fine wool, proportionate to the improvement of quality. This discouraging circumstance operates much against improvement; and for this reason it has been suggested, that it is desirable to have convenient local depositaries for fine wool, in principal parts and places, near the clothing manufactories, to the end that a better distinction of the prices may be made and settled.—Such an alteration must be gradual; but the sooner a beginning is made, the better

better encouragement will be secured for our home improvements of quality. In the West of England, the chief corn-market towns, and the port of Bristol, are considered as the most favourable places for the establishment of such useful marts. Wool, to those towns, may easily be sent on loads of corn, and by trading vessels.

Under the idea of *inclosure*, the writer must respectfully refer to some particular opinions delivered by the *Monthly Reviewers*, in their remarks on his Introduction to the Eighth Volume of these Papers,\* but he must first express the pleasure he felt on finding his sentiments, on important topics in general, approved and applauded, both by these able criticks, and the authors of the *Analytical Review*, for the same month. To stand under the sanction of such judgment, is at once flattering and encouraging to a man whose warmest wish is that of contributing to the improvement, mental and social, of his fellow-citizens.

The *Monthly Reviewers* laudably deprecate the consequences of a permanent general *Inclosure Bill*, not duly guarded by *clauses and provisions*, founded on the most liberal and patriotick principles.—In this general sentiment they are joined by every wise and good man, who has thought on the subject. What those *clauses and provisions* should be, might become (like all other questions) subjects of some variety of opinion; but in the event of a serious attempt to frame such a bill, it is probable the shades of difference would not be very wide, on the most important points. We might fairly hope to see the interests of the Lord of the Manor and of the Rector, with an allotment of land for the poor, and for wood plantation, duly adjusted, according to their respective importance. But any imperfection, con-

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\* See Review for July 1798.

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sequent on the frailty of human foresight, might be afterwards lessened; and the perfection of a bill, which would bear, as to its principles, the most able criticism, and in its application the severest trial, may be expected, as a fair consequence of due deliberation.

But one, and a first, object of such a bill must be, *turning the greatest possible quantity of land to an improved account*. Now, with all the deference which the writer feels for such authority, he must beg leave, in the name of many Members of this Society, to differ from the Monthly Reviewers, respecting their claim of “a very wide border to be preserved on each side of the publick roads.”—*Cui bono?* If to be cultivated, would it not be better inclosed? And can it be equally productive if *uncultivated*? If the benefit of a summer track for horses and carriages were any object, it would be chiefly an half-yearly one; and would not the *use* be so far forth destructive of the natural produce, for any kind of food? Where there are no summer roads, will not briers, rushes, docks, thistles, and numerous weeds abound? In flat, and in all moist situations, such a use of borders would be prevented by frequent *cross trenches*, to carry off the water from the roads to the main ditches. Where such borders are reserved for digging *stone or gravel*, are they not commonly deformed and dangerous? If such large reservations are to be made for casual fencing in, for the future purpose of *cottage-building and gardens*, is not such a general provision improvident as to the scale of it? Uncertain as to its *use*? And liable to become ragged and irregular by that use? If it be called for, as a space by the way-side, for the grazing of cattle for cottagers, to which no man has a particular right, and which, therefore, no man will take any pains to keep decent, it must be less valuable to individuals than a small portion of *their own*, fenced in and appropriated.

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If, lastly, it be considered as a benefit to the publick, for the browsing of stray or travelling cattle; it must be a benefit to that publick, purchased at a *loss*, in proportion as a rude uncultivated surface is less productive and valuable than an inclosed and improved one. The common modern allowance, therefore, of forty feet should seem to be abundantly sufficient, for all useful purposes.

But if these strictures are insufficient objections to *very wide borders*, the writer would be extremely happy to rectify his ideas by the superior ones of the gentlemen, whom he now presumes to address, if they would be pleased to express them—for few men can think more highly of their abilities—no one can wish more to avail himself of their criticism.

Respecting the articles which compose this volume, they will be found to be miscellaneous, as heretofore.—And as one or more of them may be liable to a former objection, i. e. of being somewhat foreign from the business of agriculture, and on that account the less proper, it is right, once for all, to offer the general answer to such objections.

This Society has from its commencement given its *chief* attention to *agricultural* subjects; but, as its title has always announced a more general scope of patronage, by taking in *Arts, Manufactures, and Commerce*, it is considered as perfectly consistent with its plan, to admit occasional papers from ingenious writers, which may rank under either head. And such writers, on topics of general concern, whether members of this Society or not, will not fail to be treated with respect—and the Society's invitation of their correspondence is hereby again renewed.

W. MATTHEWS, Secretary.

N.B. It having been judged proper to give in this volume Mr. SOL's list and characters of English Grasses, the question of giving also engraved specimens, to render the article more complete, did not escape the Committee. But to avoid both improper incumbrance and expence, it was deemed sufficient to give engravings of about one dozen of the most valuable Meadow-Grasses, as ranked by our judicious botanist. That number of engraved specimens is therefore given, and it is hoped with sufficient accuracy, to enable the common farmer to distinguish them in his pastures, and to collect their seed if he pleases.

*Those* Plates to be placed together between pages 164, 165. The Plate of Harrows, Drags, Drain-Plough, &c. between pages 214 and 215.

The Table of the Weight of Stock between 290 and 291.

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#### ERRATA.

In Introduction—4th line from the bottom, p. viii. for 71. read 70.

Page 97, read ART. X.

105, read ART. XI.

110, read ART. XII.

130, 6th line from the bottom, for *an ingenuous* read *ingenious*.

## LETTERS

TO

### THE BATH AND WEST OF ENGLAND AGRICULTURE SOCIETY.

#### ARTICLE I.

*A Series of Experiments in the Culture of Potatoes, with Remarks on the same, and on the general Culture of this valuable Root.*

(By the Rev. ALEXANDER CAMPBELL.)

SIR,

*Kilcalmonell, Nov. 1, 1795.*

IN consequence of your application to me through Mr. MCNEILL, I send you an abstract of the result of my Experiments on Potatoes, with some observations arising therefrom. As your being at Bath leads me to suppose, that you intend laying them before the very respectable Society at that place, for the

advancement of agricultural knowledge, I have likewise sent an account of the method by which I raise much greater crops of that valuable root, as appears in the experiments, in soil which you know is far from being good.

Sometime ago I invented a plough, the stock or share of which is so formed as to render a coulter unnecessary, and is attended with all the advantages, without the defects, of that instrument. It makes the plough fitter for cutting up stiff land, and it prevents it from being choaked by stubble. Were this stock, and a muzzle, or plough-regulator, (likewise of my invention) and the common wood-work, added to one of the cast-iron bodies, invented by the Rev. Mr. COOKE, and mentioned in the Bath Papers, vol. v. page 429, I think it would make a stronger, a more compleat, easier drawn, and, when the durability is taken into the account, a cheaper plough, and better fitted for making good work than any that has been hitherto used. And if one of those bodies were sent as a pattern to this country, the above-mentioned parts of my plough could be added to it here: and if on trial it answered the above expectations, it might be copied by the foundry at Greenock, and then the use of it become general. The advantage to the country at large, and even to persons having such interest in it as you have, would probably be greater than I at present can have any conception of. Nor am I without the

pleasing

pleasing hope, that this conjunction of the improvements of two clergymen, in different parts of the united kingdoms, may prove equally acceptable to both countries. May the time soon arrive, when it shall be the united wish of all descriptions of people amongst us, that our cast-iron guns may be made into cast-iron bodies of ploughs, our swords into plough-shares, and our spears into pruning-hooks!

I have invented two small Harrows, for the purpose of the horse-hoeing husbandry; and I have made an improvement on the harrow for common operations, which removes its defects, and renders it superior to those invented by Mr. TREFFRY and the Hon. Mr. SANDILANDS. A description of them, and of the share and regulator, or of the whole of my plough, if you desire it, shall be sent you.

That Bath may contribute to your health, as its valuable Agricultural Society does to the good of the community, is the sincere wish of,

Sir,

Your most obedient

And very humble servant,

ALEX. CAMPBELL.

## EXPERIMENTS ON POTATOES.

Value per Acre of  
the produce af-  
ter the Seed is  
deducted.

Inches distant  
in the Rows.

Row.	In 1790.	l.	s.	d.
1. Small whole potatoes	6	16	6	7 $\frac{1}{2}$
2. Large pieces	3	15	16	6
3. Large pieces	6	15	8	6
4. Large pieces	12	13	4	1 $\frac{1}{2}$

In 1791.

1. Large whole	6	18	18	1 $\frac{1}{2}$
2. Small whole	3	18	1	4 $\frac{1}{2}$
3. Small whole	6	17	11	9 $\frac{1}{4}$
4. Small whole	12	17	3	0
5. Small pieces	6	16	1	5 $\frac{1}{2}$

In 1792.

1. Small whole	6	19	7	1 $\frac{1}{2}$
2. Large whole	6	18	18	1 $\frac{1}{2}$
3. Large whole	12	18	9	9 $\frac{1}{2}$
4. Large pieces	6	18	3	0
5. Small whole	12	18	1	5 $\frac{1}{2}$
6. Large pieces	12	16	19	6

In 1794. Table 2.

1. Middle-sized whole	12	32	8	0 $\frac{1}{2}$
4. Small pieces	12	29	19	2 $\frac{1}{2}$
6. Small whole	12	29	2	4 $\frac{1}{2}$
5. Small pieces	6	28	17	6 $\frac{1}{2}$
7. Small whole	6	26	19	3 $\frac{1}{2}$
3. Middle-sized whole	6	25	7	5 $\frac{1}{2}$
2. Middle-sized, confined to one eye and stem	12	23	12	1 $\frac{1}{2}$

Without

Without dung in 1795, after dunged potatoes.

			£.	s.	d.
7.	Middle-sized whole	- - -	6	—	28 11 7 $\frac{1}{2}$
9.	Large pieces	- - -	12	—	26 1 10 $\frac{1}{2}$
4.	Small whole	- - -	12	—	24 2 11 $\frac{1}{2}$
5.	Middle-sized whole	- - -	12	—	24 2 11 $\frac{1}{2}$
6.	Middle-sized whole	- - -	9	—	23 19 5 $\frac{1}{2}$
3.	Large whole	- - -	12	—	23 10 8 $\frac{1}{2}$
1.	Shoots	- - -	12	—	15 11 9 $\frac{1}{2}$

The real produce from 50 yards of row, planted with shoots, was only 2 pecks 5-19ths, but only 63 of 150 came up; if none had failed, the produce would have been no more than what is stated in the table.

[This calculation, then, it is supposed, goes on the supposition that the 150 shoots had borne in the proportion in which the 63 did.]

## EXPERIMENTS ON POTATOES.

1794.

TABLE I.

Value per Acre of  
the gross produce.

Rows.

		£.	s.	d.
1.	Undunged potatoes, after dunged turnips	25	19	8 $\frac{1}{2}$
2.	Undunged, after dunged fallow	- - -	27	10 2 $\frac{1}{2}$
3.	Undunged, substituted for a summer fallow	14	10	4 $\frac{1}{2}$
4.	Purple hearted, dibbled in the top of a well-dunged row	- - - - -	48	10 6 $\frac{1}{2}$
5.	White kidney, planted in the same manner	27	2	5 $\frac{1}{2}$
6.	White kidney, upon much dung in the row	29	0	9 $\frac{1}{2}$
7.	White kidney, upon little dung	- - -	24	16 8 $\frac{1}{2}$
8.	White flat potatoes, upon little dung	30	19	0

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The foregoing tables are an abstract of the result of experiments, made by ALEXANDER CAMPBELL, minister of Kilcalmonell, in Argyleshire, on different methods of planting potatoes, in the years 1790, 1791, 1792, 1794, and 1795, with a view to discover whether it is more beneficial to plant them large or small, whole or in pieces, and to ascertain the distance at which they should be set in the row.

Similar experiments were made in 1793; but some inequality in the soil, which was not observed in due time, rendered them not sufficiently accurate for the purpose in view.

There is a separate set of experiments made in 1794, and the purpose of which will be observed by inspecting Table 1, for that year, and attending to the observations which refer to it.

Each of the experiment rows in 1790, was 75 yards in length; in 1791 and 1792, 200 yards; in 1794 and 1795, 50 yards. The numbers prefixed to the rows in 1794, table 2, and in 1795, point out the order, or *juxta* position, in which they were planted.

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*Extract from EXPERIMENT on POTATOES in 1794.*

TABLE II.

Row.	Inches distant in the row.			By Experiment per 50 yards of row.			By calculation per English acre.			Value per acre, at 6d. the Lealith- gow peck.		
	Bolls.	Pecks.	lbs.	Bolls.	Pecks.	lbs.	£.	s.	d.			
1. Middle-sized whole -	12	Produce - -	12	8	90	2	15	36	1	4 <sup>9</sup> <sub>13</sub>		
		Seed - -	1	5	9	2	13	3	13	4 <sup>1</sup> <sub>13</sub>		
		Clear produce	11	3	81	0	2	32	8	0 <sup>8</sup> <sub>13</sub>		
2. Middle-sized, confined to eye and stem - -	12	Produce - -	10	0	72	9	11	28	0	9 <sup>6</sup> <sub>13</sub>		
		Seed - -	1	10	11	1	5	4	8	7 <sup>7</sup> <sub>13</sub>		
		Clear produce	8	9	61	8	6	23	12	1 <sup>1</sup> <sub>13</sub>		

Above is a specimen of the manner in which the experiment tables were originally constructed.

If the preceding abstracts are not reckoned sufficient, the full tables can be sent.

These potatoes were planted in rows upon dung, except where it is otherwise mentioned, and then covered up with a double earth-board. In 1790, 1791, and 1792, the rows were three feet, and in 1794 and 1795, two feet and a half asunder. This, with the difference of seasons, will account for the greater produce in the last two years. The distances at which the potatoes were planted in the rows, were measured by a stick with notches, and taken from the centre of the potatoe-sets. Care was taken to have the rows as equal in quality of foil as possible, and to have equal justice done them in manuring, where manure was applied, and in horse-hoeing them. The quantity planted and raised was carefully marked in the field by the author of the experiment, and no part of the process of management was intrusted to any other person.

In the experiments, the acre is the English statute acre, of 4840 square yards; so that when the rows are three feet asunder, 4840 yards of row make an acre. When the rows are two feet and half asunder, it will take 5808 yards of row to make an acre. The bolls and pecks are the Lenlithgow measure, and the Amsterdam lb. is used as a measure of compound parts, being the 19th of this peck; the value affixed to the potatoes is the price they produce, *comm. ann.* at the Edinburgh market.

From the comparatively-small produce of potatoes confined to one eye and stem, (see experiments in

1794, table ii, row 2) the method, recommended by some writers on farming, to pull away the supernumerary stems, is evidently improper. It would likewise appear, that the doctrine broached by Dr. ANDERSON, that the acreable produce depends on the weight of seed, is ill founded.\* The potatoes in row 2 were not only confined to one eye, but to one stem, by pulling up the supernumerary ones. This last precaution became the more necessary, as stems were found issuing in abundance from potatoes which had been deprived of all the eyes; and even from two out of twelve potatoes, which had been planted after all the outer surface was pared off. The result was, that row the 2d, though it had most weight of seed, had the least produce of all the experiment rows; it had more than four times the quantity of seed contained in row 4, the produce of which, however, exceeded it at the Edinburgh prices, by more than 6l. per acre. The productiveness of potatoes, then, is probably not occasioned by the weight or quantity of the sets planted, but by their having that number of round and perfect growths, which the soil they feed in can bring to perfection. The general result of the experiments is unfavourable to the opinion, that the weight of bulb has any effect in determining

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\* We think it right to observe, that Dr. ANDERSON having accidentally seen the MS. of this piece before it went to the press, considered this remark as an erroneous deduction from his reasoning, and, with his usual candour, he will readily explain wherein.

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the quantity of produce; in most of the five years experiments, the produce from pieces of potatoes was inferior both to large and to small whole potatoes; yet, in general, the pieces exceeded the small potatoes in weight of seed.

Though the large and small potatoes, mentioned in the experiments, are relatively so, compared with one another, yet some of those, called large ones, might, perhaps, with more propriety, be denominated middle-sized potatoes. An acre of *very* large potatoes would require a quantity of seed so great as to deter any person from planting them; nor is it likely, that the productiveness of potatoes will continue to increase with their size. There is certainly a *maximum* and *minimum*, a *ne plus ultra* in the quantity of potatoe seed, as well as in every thing else. The middle-size of the human species, as well as of the different species of other animals, are the best calculated to undergo fatigue and labour; they are therefore more perfect in their kind, and consequently fitter to answer all the purposes of their creation. May we not argue from analogy, that potatoes of a moderate size are the most perfect in their kind, and consequently the best fitted to send forth those vigorous shoots, which insure a well-sized and healthy progeny?

The greater the number of strong fibres and roots, the more do they search for food, and the more earth do they displace in the course of their grow-

ing; which divides the soil more minutely, and gives it the advantage of better pulverisation; and the greater abundance there is of leaf, the more nourishment is extracted from the air and dews, which are thus made to co-operate more with the vegetable pasture in the soil, in bringing the plants to perfection; and the thick foliage of the crop by its umbrageous shade, has the same ameliorating qualities with a heavy crop of peas or beans, in destroying weeds, retaining the dews, and preventing the drought from penetrating and exhausting the soil.

It is to be observed, however, that too many, as well as too few, stems are unfavourable to the prevalence of fibres, and to the luxuriance of the leaves. Perhaps pieces about 2 oz. weight, are the most proper for being planted, and whole potatoes from that weight to one ounce; these may be called large pieces, and small potatoes; and from them, it is probable, there will issue a sufficient number of stems to produce as many roots as the immediately surrounding earth can bring to perfection. To produce more, would make the roots small: to produce fewer, would give a less quantity of root from the acre.

The roots procured from small whole potatoes, and from large pieces, both planted at 12 inches distance in the row, were better sized than those from large whole potatoes; and the roots from plants at 12 inches were larger than from plants at 6.

Large

Large potatoes planted whole at any distance, and whole potatoes or pieces at a nearer distance than 12 inches in the row, send forth so many stems, that, like cattle upon over-stocked pastures, they starve each other, and the produce is dwarfish.

Shoots, small pieces, and potatoes confined to one stem, or a very few, resemble cattle upon pasture not nearly stocked; which, therefore, cannot make the proper returns to the owner. Large potatoes are more easily disengaged from the soil than small ones, and are more readily perceived at the time of taking them up; and therefore are in less danger of being left ungathered. They take less time in gathering, which makes the expence of that operation smaller; and they sell better in the market. An objection to them, that they are not so easily boiled, is removed by splitting them, which will likewise make them drier, and better tasted. These advantages, attending the produce of small potatoes and large pieces, added to the œconomy in the article of seed, and the saving of time in planting them, seem to balance any little superiority, in point of quantity, gained by planting large whole potatoes at 12 inches, or any size of potatoes or pieces at a nearer distance in the row.

Roots, so small as not to be distinguishable from the produce of curled potatoes, ought never to be planted where potatoes are subject to that disease. From eight potatoes, the produce of one curled one, planted

planted in 1795, three came up curled, and that in a farm where it was a matter of difficulty to find a curled plant, upon which to make the experiment.

A disadvantage attendant upon planting shoots instead of potatoes is, that they do not ripen near so soon, and are therefore more exposed to injury from the equinoctial gales, and from early frost; neither do they admit of being planted so early as potatoes, as they are more delicate, and more apt to be hurt by the cold. But the chief disadvantage is, that many of them fail entirely, or become such bad plants as to have very little produce.\*

*Observations on the Experiments,*

*table 1, in 1794.*

**Observation 1st.** It is of great consequence to the farmer, to pay attention to the kind of potatoe used for planting: see the amazing difference between No. 4 and No. 5. Though the most productive kind should not be the best tasted, it ought however to be planted for the use of horses, cows, hogs, and poultry. The potatoe in No. 8, is the best-eating potatoe of those mentioned in the experiments; yet the produce from it, with little dung, exceeded that from No. 6 with much dung.

**Observation 2d.** From the difference between No. 6 and No. 7, the former of which had three

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\* Such are the opinions of this respectable writer on *shoots*; but he seems to have been less successful than other gentlemen of equal credit.

times the quantity of dung that was applied to the latter, the farmer will judge whether it is his interest to dung sparingly or plentifully; always paying a due regard to the condition of his soil, and the expence at which he can provide manure.

Observation 3d. From the produce of No. 3, it appears, that undunged potatoes are preferable to a summer-fallow without dung. And from comparing No. 1 with No. 2, it is clear that a dunged summer-fallow is not so profitable as a dunged crop of turnips, both followed by a crop of potatoes with dung. An acre of potatoes at 27l. 10s. 2 $\frac{1}{2}$ d. after a dunged fallow, will bear no comparison with an acre of potatoes at 25l. 19s. 8 $\frac{3}{4}$ d. added to a crop of turnips, the produce of the preceding year, of 30 tons.

Observation 4th. From a comparison between rows 5 and 6, planting potatoes upon dung in the row seems to be a better method than dibbling them in the top of the row, after the dung is covered up. But where the farmer is so situated, as to be under a necessity of planting them in a wet soil, perhaps it may be his interest to place them in the top of the row, as this method will keep them from the cold and moisture at the bottom, which would be apt to destroy them.

Where kale and cabbage are planted in the fields, the roots of them become no inconsiderable object as a manure for potatoes. When placed under them in the row I found them equal to the best dung. I had

had likewise great returns from potatoes manured with peat dust, or crumbled peat. A neighbour of mine, Mr. SINCLAIR, at Whitehouse, informed me, from his own observation, that potatoes raised from the *seed* are inferior, as to size and prolificacy, to old potatoes, for 6 or 8 years; but superior for 16 or 20 years afterwards, not only to potatoes planted for a number of years in the same soil, but to the first crops from potatoes brought at a distance. If this be so, it makes the raising of potatoes from the seed more than an object of curiosity. As to the having a variety of kinds from potatoe seed, I had, in 1795, from the seed of a white round potatoe, both round and long ones. And from the seed of black potatoes, I had black, white, pale-red, and a few clouded or spotted. It is to be observed, however, that I found a number of potatoe-seedlings coming up in the neighbourhood of my experiment plot, from apples not killed by the severe frost in the winter 1794. Some of them might have got into the plot itself, and destroyed the accuracy of my experiment, which must, therefore, be repeated another year, in soil where potatoes have not been formerly planted.

The Postmaster at Tarbert, a few miles from this place, assured me, that potatoe-seedlings came up for five years successively in his garden; and they have been found growing spontaneously on the estate of Largie, at a considerable distance from any place where

where potatoes had ever been raised. This may account for some people's finding a variety of kinds from potatoe seeds, while others found only one.

*The Minister of Kilcalmonell's method of managing his Potatoe Land.*

The land is ploughed up before the winter-frosts set in, while the stubble is strong and rank upon it, with a plough invented by him, which does not choak in the rankest stubble, and which buries the stubble compleatly. It is cross-harrowed the first dry weather in spring, and gets a second ploughing lengthways. At the time of planting the potatoes, which ought to be as early in April as it can be done, without danger from frost, the land is again cross-harrowed, and ploughed lengthways; after which, it is cross-harrowed till the furrows are made even with the ridges: and by means of a double earth-board plough, straight parallel furrows are drawn, two feet and a half asunder. This will be more accurately done by going twice in the same tract, the first time down hill, if the land be sloping, as the plough is pulled by a single horse. The dung-carts are then introduced, (on the upper side of the field, if the land be hilly) the horse going in one furrow, and the cart-wheels in the furrows on each side.

The drivers walk behind the carts, with crooked three-pronged forks in their hands, with which they draw the dung out of the cart, and leave, in small

small heaps, in the row the horse goes in, a sufficiency for it and the row on each side. It is immediately divided by women and children among the rows, and spread in them as equally as possible; upon the dung the sets are placed, 12 inches asunder. The middle-sized and small potatoes are left uncut. The large ones are either separated from the rest, for the use of the family and for cattle, or made into two or three pieces for being planted. The potatoes and dung are then covered up by splitting the ridges between the rows, going twice in the same tract as when opening up the rows.

*Advantages attending early-planted Potatoes.—* 1st. They are more mealy and better tasted. 2dly. There is a greater chance of a dry season to take them up in. (If housed wet, they must be dried by thin spreading, and frequently turning them; or they will not keep.) 3dly. There is less danger of their being lost in the soil by moisture or frost, after they are ripe. 4thly. The land can be ploughed dry after the potatoes are removed. Ploughing it immediately after the potatoes are off, keeps it dry through the winter, and exposes the seeds and roots of grass, &c. to be destroyed by the frost. Oats are sown in spring upon the furrow; as giving it another ploughing, after the frost is over, would bring up fresh weeds to injure the crop, and would bury the surface which had been meliorated by exposure to the influence of the elements.

The potatoe land is harrowed, when the growths from the sets under the surface are about an inch long; this can be known only from inspection. It is impossible to say, in how many days it will happen after their being planted, as it will depend on a variety of circumstances: such as the season of planting, the quality of the soil, the state of the weather, the kind of potatoe, the nature and quantity of the manure, &c. Harrowing potatoe land destroys the first crop of weeds, and creates a fine pulverized soil for the plants to feed in, when they arrive at the surface.

By delaying this operation till the above time, the vegetation of the weeds is more advanced, and consequently they are more effectually destroyed; by delaying it much longer there would be a danger of breaking off the potatoe shoots.—The harrow used by A. CAMPBELL is a folding-harrow, invented by himself, drawn in the intervals by a single horse; it applies stuff to the opposite side of two contiguous rows, destroys the weeds, and pulverizes the soil without levelling the row, which would tear up many of the potatoes, or break off their shoots, and deprive the land of the advantages it has, by lying dry when the shapes of the rows are preserved. A lighter harrow, on the same plan, is employed in smoothing the rows intended for turnips and other small seeds, immediately before they are sown: When the potatoe plants are all early seen, the earth and weeds are removed from them, going as

near

near as possible to them with a shallow furrow, and turned into the middle of the intervals by a horse-hoe ; which is the same with A. CAMPBELL's large plough, on a smaller scale, with a very narrow earth-board. If it be done sooner, there will be danger of tearing away those which are not seen, if the hoe be allowed to come near enough to the rest. If it be delayed longer, there will not be the same benefit derived from horse-hoeing. Any weeds and grass which shall have escaped the plough, both now and to the time of taking up the potatoes, are carefully to be pulled up by the hand.

In a few days after the first hoeing, the same instrument is to go deeper in the former tract. This stirring will make the earth in the intervals free, that has been trampled down by the weeders, and it will bury the weeds they have pulled up. When the weeds, buried in the intervals, are rotted or converted into vegetable food, the earth is returned to the plants with a double earth-board-plough, going twice in the same tract with a shallow furrow ; the first of these times down hill, if the land be hilly, a boy following the plough to uncover any plants that have been buried in the row ; for, if left in that situation, their growth would be either entirely stopped, or very much retarded. If, by avoiding to bury the plants, they should be left in some places without any mould touching them, it is drawn towards them in those places with a hand-hoe.

When the plants are about six inches in length, the earth is raised higher towards them, by the double earth-board going twice in the tract of the former earthings, but much deeper than before; which finishes the horse-hoeing of the crop. The roots are taken up with a fork with three prongs. To make this operation easier where the land is stiff, the outside of the row, in which there are no potatoes, is pared away by going round every other row with the horse-hoe, and when these are dug, returning to the remaining ones; that is, the earth is removed from the 1st, 3d, 5th, 7th, &c. and when the potatoes are taken out of these, it is removed from the 2d, 4th, 6th, 8th, &c. The injury done to the roots by the plough and harrow, and the great number unavoidably left in the soil, is not compensated by the saving of time and labour in taking up with those instruments.

The great returns A. CAMPBELL has had from potatoes, as appears from his experiments, and that in soil by no means equal to the average soil of Britain, are the best vouchers for the goodness of the foregoing method of management. In wet land, the potatoes, instead of being planted upon the dung, are pushed by the hand into the top of the row after it is formed, by covering up the dung, and the holes filled up by the hand-hoe. By this method the potatoes, though not so productive, are better tasted, and in less danger of perishing from moisture.

Potatoes

Potatoes planted in this manner, do not admit of being harrowed; which may be one reason why the produce is less. It is greater, however, in lazy-beds, a method which ought never to be used, excepting in small corners, in soft, deep, or in shallow rocky soils, which are inaccessible to the plough, or in bringing stubborn new land into culture.

In planting potatoes in rows without dung, or where the dung has been previously incorporated with the soil, the furrows in which they are planted ought to be much shallower than when the dung is placed under them. Potatoe stems ought never to be cut at any period of their growth. The roots continue to improve till the stems have decayed, so as not to be worth cutting; but they become stationary the moment they are deprived of the stems. Much less ought cattle to be allowed to go among the potatoes before they are taken up. Besides injuring the stems, they poach the soil, and expose the roots so much to the air and moisture, that many of them perish.

[It is hoped no material inaccuracy has crept into the foregoing piece; but it was printed off from a *copy* not the most *legibly* transcribed; and the *original*, from some accident, was mislaid by a gentleman, to whose care it had been entrusted.]

## ART. II.

*The following Statement, founded on the practice, and delivered on the veracity, of the Subscriber, with a view to the Premium or Bounty of this Society, was rewarded with a bounty of Ten Guineas in plate, as a token of the Society's approbation.*

## On DRILLING CORN.

(By MR. JOHN EXTER, of Pilton, Devon.)

IT seems extraordinary that a subject of so much importance to the farmer, and the publick, as the comparative modes of sowing corn by the Old or New Husbandry, should have been so little attended to by men of abilities, and by gentlemen of landed property, whose interest is so much connected with it, as to have remained such a number of years undetermined, since it was first introduced by Mr. TULL; and that some more satisfactory and conclusive experiments have not been made, and published to the world, to determine the matter with greater precision. But so unsettled is this important point at this day, that we find some of the best practitioners in agriculture, not only in different soils and districts of country, but even on soils of the same nature,

nature, and within a few miles of each other, constantly disputing on the propriety of one or the other mode of practice; and this seems the more extraordinary to me, as my own experiments, which have been pretty extensive, and I flatter myself made not only with a critical, but I will venture to assert, impartial attention, have uniformly, on every soil and situation, for six years successively, been decidedly in favour of the new system.

In the year 1790 I made my first trial of drill husbandry, by sowing a small part of a field with WINTER's Drill Machine, with barley at six inches, the intervals of which were hand-hoed. The productiveness of this piece of ground, under certain disadvantages of poverty of soil, unfavourable weather, &c. was sufficient to convince me of the advantages of the system under a better management, and excited my curiosity to make further comparisons between drilling and broad-cast sowing.—In order the better to answer my purpose, I made a journey in the summer of 1791, to see different crops then growing which had been sown with drill machines, and to collect what intelligence I could on the subject; the result of which was, my determining in favour of Mr. COOKE's machine, and his system of management. I therefore ordered a machine from Mr. COOKE, which I received in the autumn following; but, owing to its being detained by unfavourable winds on the sea, too late for my wheat tillage,

that

that was finished before I received it. However, as I had got the machine, I was anxious to make some trial of it, and having only one piece of ground at that time (November) in a possible state to admit of drilling, a very foul and poor pea-stubble, worth about 12s. per acre, I determined to begin with that, though the land was neither manured, nor in tilth for corn of any kind. The field consisted of two acres and a half of light, dry, loamy land, middling barley soil, and I drilled it at the rate of one bushel of red Lammas wheat per acre, in rows, with nine inches intervals. My servant man, an orthodox manager in the old husbandry of the country, and very averse to the drill system, both on account of the apparent complexity of the machine, and the idea of the great loss of land in the intervals between the rows of plants, was directed to fix on any part of the field which he considered as best in tilth and condition, to sow it broad-cast, and to manage it exactly as he should think proper. He confessed the part he chose was better by five or six shillings per acre than the average of the drilled land, and he sowed his part at the rate of two bushels per acre, the usual allowance of the country; and during the growth of the crop he paid unusual attention to the keeping it clean from weeds, &c. The drilled crop being thin sown, made but a poor appearance till June; the broad-cast, on the contrary, looked much more verdant and thriving during the winter and beginning of spring,

spring, till the end of May, at which time it became rather sickly and yellow. The drilled crop was scarified once in March, and horse-hoed in the last week of May; after this last operation it improved greatly, and began to shew a decided superiority over the broad-cast, which evidently continued to decline. At harvest the drilled part yielded 19 bushels 3 pecks, nine-gallon measure, per acre; the part broad-cast not quite 5 bushels per acre.

In March 1792, I drilled one bushel of white Lammas wheat on one acre of potatoe-fallow, worth 20s. per acre, prepared by once ploughing and harrowing. The plants, when double-leaved, had one scarifying, and immediately after were harrowed across with the common harrow, and when six or eight inches high, were horse-hoed; the crop appeared very thin till after Midsummer, yet I had a very great produce at harvest, both of grain and straw; the acre yielded 29 bushels 3 pecks of wheat, nine-gallon measure.

The same spring I tilled 30 acres of land, worth from 35s. to 40s. per acre, with barley; fifteen acres drilled at two bushels per acre, with rows at nine inches; and fifteen acres broad-cast, from three to four bushels per acre; the preparation of the land, manuring, &c. in every respect alike. The season proved very wet, both during the growth of the crop and at harvest:—The part broad-cast was lodged, stained, and with great difficulty harvested at all;

all. The drilled corn stood better, scarcely any of it was lodged, and being free from grafts and weeds, was all saved without the least injury, at half the extra expence of the broad-cast; the produce of grain from ten to fifteen bushels per acre more, and a shilling per bushel better, and this notwithstanding the whole of the broad-cast crop had the advantage of being the first sown; a circumstance which, that season, was particularly remarked by the neighbouring farmers to have been universally favourable to the crop; the early sown barley having every where succeeded better than the late sown.

In October following I tilled a field of ten acres with wheat; the management of this field, with respect to tilling, manuring, &c. in every respect similar, except that one half was drilled with half the quantity of seed at nine-inch intervals, and that the other half was sown broad-cast. But as some doubts were advanced respecting the value of the land on different parts of the field, two twelve-furrow ridges, by way of proof, were gathered through the middle of the part intended to be drilled, and the drilling was begun on each side of those ridges. The ridges were ploughed, sown, and managed according to the common husbandry of the country, by the person before-mentioned, and every attention paid to weeding them in the spring; the drilled crop was scarified and horse-hoed once. At harvest the two ridges were cut first, and immediately after a breadth of the broad-

broad-cast on each side of the ridges was cut, and each part stacked and kept separate till it was dry enough to thresh, when it was carted into two different barns, and immediately threshed and winnowed; the drilled crop yielded 29 bushels 3 pecks, the broad-cast 20 bushels 1 peck. In order to guard against any supposition of fraud or imposition, the whole was winnowed and measured by the same man, the person who was so very averse to the drill system, and conducted the experiment in favour of the broad-cast against me; whose honesty I could depend on, though so much prejudiced against the new mode of management.

The advantages gained in the above experiments by the drill system, gave me such a favourable idea of it, that I have ever since followed it for the whole of my crops, and have repeatedly sown a part broad-cast by way of proof; and have never once, among all my trials, seen the broad-cast sowing equal the drilled part. In all the experiments alluded to, I speak of white-straw crops only, as I believe the greatest enemies to drilling admit its advantages in all crops of pulses; and I am certain it is equally superior to broad-cast for turnips. In the whole course of my attention to this system, I have endeavoured to steer as clear as possible from every prejudice that theory might suggest, and confined myself only to those positive facts that arose from absolute practice. I shall here then briefly enumerate the advantages

advantages that appear to me to attend the drill system, and afterwards state the disadvantages I have heard it charged with by other Agriculturalists.

*Advantages of Drill Husbandry.*

- 1st. Saving of half the seed-corn usually sown.
- 2d. A more regular and certain growth of that seed, from its being deposited at such depth in the soil that it immediately vegetates, and grows on more regularly together, and ripens at the same time; a matter of great importance in a dry spring sowing.
- 3d. Assisting the growth of the crop by pulverizing and breaking the soil, and destroying the infant weeds during the growth of the crop on it, by scarifying and horse-hoeing.
- 4th. Producing a larger and better crop; which is
- 5th. Harvested at a less expence, and with a greater certainty, as it never abounds with grafts, weeds, &c. as broad-cast corn often does, and is never injured by the luxuriant growth of artificial grasses in wet summers.
- 6th. The scarifying and horse-hoeing leaves the soil in a much more friable state, and causes it to work much freer, and prove more productive for the future crops.

The field sown half broad-cast, and half with the drill-machine, in the year 1791, was all sown the following year with oats broad-cast; and the part on which the corn was drilled the preceding year, and

had

had produced a much larger crop of wheat, produced a much larger quantity of both straw and corn than the part of the field did on which the wheat had been sown by hand. The line of drilled part and broad-cast was as distinctly to be seen by the superiority of the crop of oats, as it was marked by that of the wheat the preceding summer; a circumstance by no means to be accounted for but from the effects of the operations of scarifying and horse-hoeing on the soil. It may be said, that a good fallow previous to sowing the crop may have the same effect. I am inclined to doubt it; but if it should, it will not be so cheap and concise a method, and a certain time must be lost in the preparation, to say nothing of the labour employed in it.

I will now state the *disadvantages of drill husbandry*, which I have heard advanced by gentlemen who have unsuccessfully attempted it, and add my own remarks on them.

1st. The difficulty of finding a person acquainted with the use of the machine.

This, though no objection to the system, will remain a difficulty before it becomes more general, but is a circumstance attending every new practice.

2d. The soil must be very well prepared to admit of it.

Not at all finer than for good management in the broad-cast.

3d. The

3d. The crop is too thin sown, and land lost in the intervals.

This objection has some force on certain soils, if the scarificator and hoe be not used, but is entirely done away if it be well managed.

4th. Harvesting later than broad-cast crops.

This might be brought in argument against a dung-hill, though few modern farmers will reject its use on that account.

5th. Clover, not succeeding with it.

My crops of clover speak powerfully in favour of it: I have never had better in the common way.

6th. Oats, producing straw rank and coarse, and not good food for cattle.

If oxen are admitted as evidence, I am sure they will prove the contrary; mine have been alternately fed with drilled straw and broad-cast for months together, and no difference was perceptible in their thriving on one or the other.

It appears to me, from the experience that I have had, that the first and greatest objection to this system is the difficulty of procuring a person who is acquainted with the use of the machine, and the after-management of the crop during its vegetating process. I am persuaded, if I had not gone through every part of the business myself, that my drilling would have been a work of a season only; by entering myself into the minutiae of it, and by doing the whole business, I found the difficulty of sowing soon done

done away, and I think I could undertake to make any young man a compleat drill-man, in one half the time he could be taught to manage a common plough; attention and practice, with a small degree of instruction, are the only requisites to compleat him in either. With respect to the scarifying and hoeing, much remains at present to be learnt; and I am not satisfied that the precise time of first scarifying is yet scientifically determined on: from the experience of this year, I am induced to think it should not be done too early, on very light and dry soils, perhaps not till the coronal root of the plant is completely formed; as it was found this season to expose the corn more to the ravages of the wire worm; but on strong soils this objection has no weight, and it may be begun as soon as they are dry enough to admit of the horse going over them without poaching.

I here think it necessary to remark, that I guess these operations of scarifying and hoeing\* have been too often neglected altogether, to the very great injury of the system; many gentlemen who have drilled, have looked no farther into the business. I have myself seen instances of this inattention, and am

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\* The first operation of scarifying in the spring should but just move the surface, the instrument should not be forced deep into the soil, particularly in light lands worked early. The repetition of this operation is not so very nice a matter; when the plants are vigorous and about six or seven inches high, the intervals may be worked to a considerable depth.

convinced

convinced how severely the system has been injured by it. I must here again repeat, for it cannot be too rigidly insisted on, that on these operations being well followed up, the whole advantage will depend; and this leads me to observe, that on those soils where this cannot be done, perhaps drilling may be altogether improper.—A question then naturally arises, on what soils is drilling practicable with advantage, and on what is it improper? I conceive it practicable on all soils that are not very stony or rocky, or so very *declivous* that the machine or scarifier cannot be worked with two horses with facility. It has been said by some gentlemen who have tried on heavy clay soils, that these are unfavourable to its use, that the coulters do not deposit the seed deep enough in the soil. In the heaviest soils I have tried, it produced me the finest crops. I have never occupied any very obdurate clayey soils, but on those strongest loamy soils which I have drilled, I have produced the best crops, and comparatively more productive than on the lighter ones; and am therefore inclined to believe, that few soils are to be objected to as unfavourable to the system, on account of their stiffness merely. To say these soils will only work in a certain degree of moisture and temperament, and therefore will not admit of drilling, is saying nothing, but what may be said against ploughing or harrowing, &c.—Whenever the soil is in a condition to admit of harrowing or dragging, it may be drilled with propriety.

Having

Having for several years past been in the habit of instructing pupils in the theory and practice of agriculture, I have made a point of recommending to them the use of the drill machine, on a different principle than either saving seed or producing a greater crop, or any advantage already mentioned; for I will venture to assert, that a young practitioner in husbandry will gain more knowledge in the business of aration, and the advantages of a well-managed fallow, by drilling his crops one season, than by three years attention, assisted by good instructions, without it. Bad ploughing, bad harrowing, couch, clods, and every thing that a good farmer knows he ought to avoid or correct, are detected by it. The test of good or bad management in every part of his field, is immediately under his own hand; he cannot pass a single foot of land in bad tilth without instantly perceiving it; and I believe it will be readily allowed by every good practitioner, that whatever will obstruct the drill, would annoy the crop to be sown; or in other words, the compleater the pulverization of the soil, in general, the more luxuriant will be the produce.

Among the advantages of drilling, has been marked that of stirring the soil during the growth of the crop, and this advantage does not seem to depend merely on the pulverization of the soil, but may be accounted for by its being kept open at that time, and in a condition to absorb some matter from the

atmosphere, calculated to assist vegetation on the present, as well as future crops; this appears clearly from the effect produced on the broad-cast oats before-mentioned, and the following observation on a potatoe crop will likewise support the opinion:—  
 A foul piece of poor land was planted with potatoes in two different ways: the one part, in the common lazy-bed method; the other part, in drills of two rows at a foot asunder, and three feet intervals left between to be worked with the common plough, which interval was three times ploughed, and once hand-hoed, during the growth of the crop. A part of the same field, between the two crops of potatoes, was dunged in the same proportion as the potatoe ground, and kept clean by three summer-ploughings, and several harrowings. The drilled potatoes were by far the best crop, though planted with only two-thirds the quantity of feed. The next year the same field was sown with barley. The drilled potatoe part produced by much the best and cleanest crop; the next best crop was on that part which bore the potatoes in the common mode of management, and the summer-fallowed part, which bore no crop the preceding year, was, contrary to every body's expectation, the worst of the whole; this experiment then proves that simply pulverizing the soil mechanically, and manuring, will not equal the advantage of a horse-hoed crop, and speaks very much against summer-fallowing on light soils.

In December 1796, a few days after I had attended the general meeting of the Bath Agricultural Society, where I heard the subject of drill husbandry very slightly spoken of, I went into Gloucestershire on a visit to a gentleman of my acquaintance near Wotten-Underedge, and walking with him through a wheat stubble, I observed it had been irregularly drilled at one foot asunder, and which he told me had been done by his labourer and his family. The labourer, by my desire, was sent for, and informed me it had been the common practice of the neighbourhood ever since he could remember, and he had heard his father make the same remark, and from what I could trace, it must have been upwards of 80 years: he described the method as follows:—The fallow being prepared, (this was a clover stubble once ploughed, dragged, and harrowed) shallow furrows were opened at a foot asunder with the common plough, and in these the seed was sown by women and children from phial bottles, and after sowing, the lands were harrowed lengthways. Quantity of seed one bushel per acre, expēnce of drilling 6s. The space between each row was dug with a hoe, or small mattock, in the next spring, in order to destroy weeds, &c. The man very gravely asserted, that no clean wheat could be got in their neighbourhood by any other mode, the soil being so very subject to weeds. Here then is a strong proof of the drill system prevailing under heavy expences, and an auk-

ward mode of management, long enough to establish its reputation with the common labourer. The crops produced by this mode were fine, and the grain good.

It was my intention this season, for the satisfaction of the Society, to have made some farther comparative trials on spring corn; but having determined, for the first time, on drilling my clover between the rows of corn, I was a little embarrassed on that account, and my comparative crop was confined to a single field of very high poor ground, value 10s. per acre, its exposure due north, and perfectly open to the stormy north-western gales, which are very violent in North-Devon. This field had borne a crop of drilled wheat, about 16 bushels per acre, the last season, for which crop it had been prepared in the usual manner by paring, burning, and a manuring of lime. Half this field was sown with barley, the other half, which was very *declivous* to the north, sown with oats; nearly half the barley ground was drilled, partly at 9 inches, partly at 12 inches distance; the oats all sown broad-cast, except three-fourths of an acre, which was drilled with one bushel and two pecks of white oats at one foot asunder. At harvest the drilled was evidently the cleanest, heaviest, and best crop; but a very heavy gale of wind arose a few days before it was to be cut, which shed a great quantity of the grain, and as the drilled corn was longer eared, and the straw longer, it suffered more than the broad-cast, which was very short and small eared.

eared. Sixteen perches of the barley drilled at a foot, and the same quantity of the broad-cast barley, were immediately bound after the scythe, and wind mowed, and as soon as dry, carted into two separate barns and threshed. The same was intended to have been done with a certain proportion of the broad-cast oats, but the very unfavourable weather at harvest prevented me from attending to it, and my people hurried away the broad-cast oats adjoining to the drilled part without my knowledge; but the extra produce of straw and oats sufficiently convinces me of its superiority, being fully double any crop of oats I ever had on the same land. The following was the proportion of the barley: the drilled 11 pecks, broad-cast  $9\frac{3}{4}$  pecks; or per acre, drilled 27 bushels 2 pecks, broad-cast 24 bushels 1 peck; to which add the saving of 2 bushels of seed per acre, makes 5 bushels 1 peck of barley, which at the last year's price of 4s. was just 1l. 1s. per acre in favour of drilling; more than double the rental value of the land on which it grew. The 120 perches of oats drilled with 1 bushel and 2 pecks of seed, yielded just 40 bushels, 9-gallon measure, or per acre  $53\frac{1}{2}$  bushels, besides a large proportion of corn shed, calculated by every body who saw it to be 8 bushels, and 85 bundles of straw 40lb. each, somewhat more than a ton and half. I never yet had more than 30 bushels, nor two-thirds the weight of straw on any broad-cast acre of oats on the same land. The balance

lance in favour of drilling the barley crop on the field above-mentioned, was by far the smallest of all the comparative trials I have made, which is accounted for by its being on the poorest soil I ever drilled with that grain; for I am of opinion, if the crop does not lodge, which seldom happens to drilled crops, that the balance will ever be greatest, particularly at the great distance of a foot between the rows of corn, on the richest soils in the best state of cultivation.

I have this season several crops of turnips, partly drilled and partly broad-cast in the same field; the advantage of drilling is too apparent to admit a doubt on it, and there is a saving of at least 4s. per acre in the hoeing of a crop drilled at 12 inches apart, besides the opportunity of doing the work more compleatly. Beans drilled in two rows at 9 inches, with an interval of 27, if well weeded early, and ploughed between as directed by Mr. COOKE, become quite a thicket. My crop of this year exceeded any thing I ever saw; and Mr. WHITE PARSONS, of Queen-Camel, who lives in a bean country, assured me he never saw so fine a crop. The fallow is in compleat order for wheat. It happened, I think fortunately, that a certain portion of this field, from the accelerated growth of the beans from the wet weather in May and June, could not be ploughed a second time between the rows, and it is now astonishing to see the difference in the friability of the fallow;

fallow; the part twice ploughed between the rows works better on a single ploughing and harrowing, than the part not ploughed between would work with three ploughings, &c. The one a fine mellow loam, the other a clay. Another strong proof of the advantages of ploughing between drill crops while growing.

I could produce a much longer list of proofs in favour of this system, but as they nearly correspond with those already mentioned, I consider them as unnecessary. I trust those already given will, to unprejudiced minds, carry the conviction, that, on certain soils at least, the principle is right, and the practice eligible; and in evidence of it I bring forward the frank acknowledgment of MR. ARTHUR YOUNG, who last year did me the honour to pay very minute attention to my crops, and declared he had seen none, in a journey of 300 miles, that exceeded them, on any soil; and that from their appearance he was persuaded, in the hands of a man of attention, the drill system would generally exceed the broad-cast,

*Pilton, near Barnstaple, Devon.*

*Okt. 28th, 1797.*

**ART. III.***On the comparative Advantages of the  
DRILL HUSBANDRY, &c.*

(By the Rev. H. J. CLOSE.)

To the Secretary of the Bath and West of England Society.

Hordle, near Lymington, Hants,

March 5, 1799.

I AM sorry your late correspondent, Mr. WIMPEY, should have departed this life before he had made a greater progress in his agricultural pursuits. He calculated, that I must have sown 8. or 1200 acres of wheat yearly, to save 200l. in seed-corn, and therefore concluded, my assertion must have been erroneous.

The facts, in detail, which I shall now trouble you with, will demonstrate, that I shall save this year, on only 131 acres of arable land, 100l. 4s. 6d. in the article of seed-corn; and then, I think, it may be fairly inferred, that I could not exceed the bounds of truth; when I asserted that I saved above 200l. a year in seed-corn, when I had more than 500 acres of arable land in my hands; though, at that time, drilling and horse-hoeing were not so well understood as at present.

*Expence*

*Expence of Seed-Corn upon 131 acres of land, sown  
in the usual broad-cast husbandry.*

Acres.		£. s. d.
31 of Wheat, 3 bushels per acre, at 7s. per bushel	32 11 0	
26 Early Peas, 4 bls. per acre, at 8s. per bl.	41 12 0	
18 Dun Peas, 4 bls. per acre, at 5s. 3d. per bl.	18 18 0	
15 Tick Beans, 3 bls. of seed per acre, at 5s. per bl.	11 5 0	
6 Early Maz. Beans, 3 bls. per acre, at 6s. per bl.	5 8 0	
12 Oats, 4 bls. per acre, at 3s. per bl.	7 4 0	
13 Barley, 3 bls. per acre, at 3s. 6d. per bl.	6 16 6	
12 Vetches, 3 bls. per acre, at 6s. per bl.	10 16 0	
		<hr/>
	Total	£.134 10 6

*Expence for Seed-Corn upon 131 acres of arable land,  
in the present improved drill-husbandry.*

Acres.		£. s. d.
31 of Wheat, 3 pecks of seed per acre, at 8s. per bl.	8 2 9	
26 Early White Peas, 3 pecks per acre, at 8s. per bl.	7 16 0	
18 Dun Peas, 1 bushel per acre, at 5s. 3d. per bl.	4 14 6	
15 Tick Beans, 3 pecks per acre, at 5s. per bl.	2 16 3	
6 Early Maz. Beans, 3 pecks per acre, at 6s. per bl.	1 7 0	
12 Oats, 1 bushel per acre, at 3s. per bl.	1 16 0	
13 Barley, 1 bl. per acre, at 3s. 6d. per bl.	2 5 6	
12 Vetches, $1\frac{1}{2}$ bl. per acre, at 6s. per bl.	5 8 0	
		<hr/>
	Total	£.34 6 0

Seed in the broad-cast husbandry £134 10 6  
In the drill husbandry £34 6 0

Saving in the seed-corn £100 4 6

You

You have here, sir, an exact account of the seed I have sown, and shall sow, on 131 acres of arable land this year; and a similar statement, taken from several farmers, of the proportion of seed they would have sown upon the same number of acres.

I must not omit mentioning another remark in Mr. WIMPEY's observations upon my letter, as it might otherwise tend to mislead your correspondents. He affirms, that the additional tillage, necessary for the drill system, more than counterbalances the advantages to be derived from the saving of seed-com. Mr. WIMPEY, I have no doubt, expressed his real sentiments, but he appears to me to have been totally ignorant of the new system of husbandry. With Mr. COOKE's Scarificators, Cultivators, and Quitch-Rake, I can completely pulverize, and cleanse from weeds, any given quantity of land, at a little more than a quarter part of the expence necessary to make an equally-good fallow with the common implements of husbandry. Neither is additional tillage absolutely necessary, as I am sorry to say, many slovenly drill-farmers till their lands less than their equally-slovenly broad-cast neighbours. At any rate, such an objection could not be valid, until it were first ascertained what additional tillage might be given with advantage. I am fully of opinion, that more than double the present scanty portion of tillage now given to the lands in England, would amply repay the farmers for their extra labour and expence. If

I were

I were to add, that four times the stock might be wintered, and the aggregate produce doubled, I should not find much difficulty in proving my assertions.

Mr. WIMPEY was also positive, that a greater produce of barley might be procured from three bushels of seed sown broad-cast, than from two bushels sown with the drill. What two bushels of drilled seed might yield per acre, I know not, but, from nearly twenty years experience, I am confident that one bushel of barley, wheat, peas, beans, or oats drilled per acre, will give a much greater and heavier crop of either of those grains, than any proportion of them sown broad-cast.

But it is time to bring the comparative merits of the two systems to some fair and undoubted test. Let the advantages of each be fully ascertained, and publickly known. A very large premium for four or six years course of experiments, would perhaps elucidate this subject. Surely it is of the utmost national importance; in my opinion, a clear saving of 5,000,000l. sterling a year might be made in the article of seed-corn, and double that sum in the produce, and application of that produce, by the improved system of husbandry, as at this moment practised by some few spirited farmers. Thus it is possible to add 15,000,000l. annually to the national wealth! Unless we have talked of millions, and read of millions, until we are insensible to the power of numbers, this seems sufficient to rouse the

attentive

attention of every Englishman who really feels attached to his native and highly-favoured soil. Were I to transmit all my experiments, by which I have formed the above conclusions, they would exhaust the patience of your readers; neither do I know of any method by which I can give additional validity to my assertions, but by offering to risk such a sum of money upon the issue of a fair set of experiments as will at once secure the attention of the publick, and a scrupulous exactness in the parties concerned.

Though, therefore, I by no means presume to think I have brought the drill system to any thing like perfection; and though I detest betting, yet, that this important national question, *whether the old or new husbandry be more advantageous*, may be determined, I here challenge all the advocates of the old husbandry in the kingdom, to bring this long-controverted subject to the test. Let 24 acres of land be chosen in a rich sandy loam, and let any broad-cast farmer till and sow one half in the usual method, with the following course of crops, without any manure,\* viz. beans, barley, peas, wheat; beans, wheat; and I will till the other half with Mr. COOKE's improved instruments, and sow the same

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\* This is by no means a course of husbandry I should recommend for general practice, but I have excluded all green vegetable crops, thinking the system which I have chosen the most trying, and therefore best calculated to ascertain the comparative merits of the broad-cast and drill husbandry.

feeds in a similar rotation with his drill machine, and I will bet 1000l. that my clear profits shall annually exceed those of the broad-cast farmer 1l. 1s. per acre for the six years course of crops.

As money is a very precarious standard, and of uncertain value, it is necessary to fix a money price to each of the grains; let beans then be 5s. barley 3s. 6d. peas 6s. and wheat 8s. per bushel.

After such a challenge, by which I may be open to the censures of those who do not feel as I do on this important national subject, you must give me leave to add a few words, to free my character from the imputation of vanity, or the more serious charge of promoting or encouraging gambling—the most pernicious and detestable of all vices. I here, therefore, acknowledge, that I am indebted to the mechanical abilities of the ingenious Mr. COOKE for all my improved instruments; and to his agricultural skill for the greater part of the advantages I have derived from the use of those implements. Thus, disclaiming all merit as an original, I hope I do not presume, when I class myself among his first and most attentive disciples. I would wish it also to be known publickly, as my tender of the bet, that whenever I am induced to make a wager, and am successful, my winnings are always applied to some act of charity, so that I always risk my money against nothing. Whatever proportion of this bet, should it be accepted, I may reserve to myself will not therefore enrich me, or my family. Thus,

Thus, sir, I hope it will appear, that my sole motive for standing forward in this business arises from an ardent wish to promote the agricultural, viz. the most important, interests of my country; and to administer to the wants of my poorer fellow-citizens, by saving about 8,000,000 bushels of wheat, 3,000,000 bushels of barley, 1,000,000 bushels of rye, 4,000,000 bushels of oats, and 1,000,000 bushels of beans and peas, which are yearly thrown away in seed-corn, independent of the additional produce, which by the new system might be obtained.—These last calculations cannot be supposed to be accurate, but I should hope the aggregate would not be very erroneous.

This letter is protracted to an unreasonable length, yet I must, according to promise, give you an account of an experiment I this year made upon some turnips drilled, to me, in a new mode; but which was recommended by Mr. COOKE, and succeeded beyond my most sanguine expectations; and also one upon the half-husbandry.

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### *On Drilled Turnips.*

TWO adjoining fields, of four acres each, which I took last Lady-Day, from a little farmer, in a very foul impoverished state, were well pulverized and cleansed by frequent scarifying, rolling, and harrowing.

rowing. The quitch-grass was drawn out by the quitch-rake, and burnt on the land. After these operations, which cleansed, levelled, and pulverized the land about six inches and half deep, one field of four acres was thrown on to ridges by one bout of the plough, three feet from the centre of one ridge to the centre of the other. A triangular sled of wood, drawn by one horse, and held by a boy, was passed at the bottom of each furrow, to make them about two feet wide.\* In these furrows some long wet straw from the farm-yard, half rotted, was lain, about ten common carts per acre; the ridges were then split, and reversed, throwing all the pulverized soil on to the dung, if it deserved that name; one horse and a boy, with a long bar of wood with handles, beat down the tops of two ridges at once; leaving a surface about 18 inches wide, and prepared the land for drilling. The horses then walked in one furrow, each wheel occupied another, and four rows of turnips were drilled on the top of two ridges,  $11\frac{1}{4}$  inches from row to row, on each ridge, and  $22\frac{1}{2}$  inches interval.

As soon as the turnips were in rough leaf, the corn scarificators were passed through them, a furrow was taken from each side of the ridge with the com-

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\* This operation was merely to widen the bottoms of the furrows, so that the rows of turnips might be exactly over the manure, and is by no means necessary when turnips are sown without manure.

mon Suffolk plough, and the turnips in the rows were hand-hoed. These operations were performed twice, and the whole land thrown up to the turnips by the common plough, which finished the operations. The field was partly sown the first week in July, and the remainder in the second week. Before Michaelmas, no appearance of intervals could be seen, and the whole field exhibited the finest, and most regular crop of turnips I ever beheld; many of them weighed 25 lbs. each, and measured 3 feet 3 inches in circumference. Agriculturists and farmers from many parts of the country, visited my little farm last year, and all were astonished at the regularity of the crop, and the size of the plants. I believe the average weight of each turnip must have been 12 or 14 lbs. The acreable weight I ascertained by weighing a few rods, and found it amounted to 55 tons. The turnips were most of them drawn, their tops and tails cut off, and stacked before the frosts, and are now, this 5th day of March, perfectly sound and good. Never, indeed, did my bullocks far faster, than on my turnips this year; they were lean working beasts, put up the beginning of November, and will soon be very fat, as they already weigh about 45 score each, and I trust they will reach 50 score each by the middle of April.

The other 4 acres were treated exactly like these, except being sown without any dung, and ten days later than the other field; yet to shew what extra tillage,

tillage, and throwing the whole of the soil to the plants will effect, I had a very even and beautiful crop of turnips, allowed to be the best in the country, except my adjoining field, and one tilled in the same method, and with equal success by my neighbour Mr. BUDDEN. The advantage of this system must be apparent. The young plants, when the land is mucked, are absolutely on a hot bed, and grow so rapidly, that they are in little or no danger from the depredations of the fly. The intervals admit sun and air without loss of land, as the whole of the pulverized soil is thrown to the part of the land occupied by the plants. The land is better tilled by the use of the horse-hoe and common plough, than it can possibly be by hand-hoeing; and the expence of hand-hoeing is reduced one half, by having merely to hoe the rows of turnips, and to singe the plants. Thus a more complete fallow is made, and a much heavier crop obtained, at about one quarter of the expence of ploughing four times, dragging, &c. as in the common system. I would not have any of your correspondents expect success in the turnip culture, without obtaining the most complete pulverization. My land, though strong, good, wheat soil, was fine as dust; and I can, from experience, recommend Mr. COOKE's instruments, as the only implements by which this complete pulverization can be obtained without extra expence. No

spade and hoe can, in my opinion, equal the tillage which may be given by a proper and seasonable use of these instruments.

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*On the Half Husbandry.*

MANY years have elapsed since I first attempted to make some experiments on the Half Husbandry. From the result of them all, I am induced to believe, it might be practised with great advantage, at least, on such lands as are situated so far from the stables, cow-yards, &c. as to make carting manure a very heavy expence. Under this conviction, I shall transmit the following experiments; though they were made on a larger scale, I shall reduce the account to an acreable one, for the convenience of those who may wish to peruse it.

One field was fallowed for two years and dressed very highly. In September 1795 it was put on to ridges, 4 feet 8 inches wide, exclusive of the furrow. The last day of September, or the first of October, every other ridge was drilled with red wheat, a little more than 3 pecks per acre,  $11\frac{1}{2}$  inches from row to row. It was twice horse-hoed in the spring, and the 4 feet 8 inches, fallow ridge, was ploughed up to the wheat and back again, and then one furrow was thrown up to each outside ridge on which the wheat

was

was drilled. The wheat was so very luxuriant, that it was lain in the grass, and I was obliged to feed it with sheep until the middle of April. One row of potatoes was then planted in the centre of the fallow ridge; these were ploughed between, and well hoed. The produce of the two acres of land was, wheat seven quarters and three bushels per acre; potatoes, per acre, one row on each fallow ridge, fifty sacks.

The following year, the potatoes were grown on the ridge occupied by the wheat the preceding year, and the wheat upon the fallow ridge where the one row of potatoes grew. Both crops looked equally strong and good the second year, but I was too ill to attend to the experiment, and never could ascertain the result of it. But there can be no doubt, but by thus alternately cropping and fallowing, the land would improve every year. I made a similar experiment in an adjoining field, trusting entirely to pulverization, without manure. From this field I had taken two successive crops of potatoes, without any dressing; both crops were very good. The potatoes were planted with three-feet intervals, and ploughed between; the land was in very high tilth, drilled at the same time, and in the same method, as the other field. In the spring the wheat looked thin, but of a good colour. It was twice horse-hoed, &c. and at harvest, to my surprise, produced seven quarters one bushel per acre, only two bushels less than the field which had been manured at 5l. per acre

expence. I had only 40 sacks of potatoes from the one row on each fallow-ridge in this field. In the same year, in an adjoining field, there was a fine crop of broad-cast wheat to appearance, after beans, well dunged; and the farmer assured me, he had only three quarters and an half per acre. Indeed the ears of the broad-cast corn were very small, and about three or four inches long. In my red wheat I had many ears eight inches long, measured by numbers of gentlemen who came to see my crop.

I wish these experiments had been continued for a series of years as I intended, and then the result would have been much more interesting.

I am, sir,

Your most obedient servant,

**H. J. CLOSE.**



## ART. IV.

The following Letter was written in Answer to an Enquiry, what particular Advantages the Author found attaching to the Cultivation of the MAZAGAN BEAN, in Agriculture.

In a Letter to the SECRETARY.

DEAR SIR, Hordle, March 15, 1799.

I Shall always be ready to answer any queries you may wish to refer to me. To the best of my recollection, I never grew more than seven quarters of early mazagan beans per acre, and of the tick beans I have had eleven quarters per acre. The mazagan fell for 3s. or 4s. per quarter more than the tick; but this alone would not induce me to cultivate them. I have too objects of more importance, which will explain my reason for always drilling some part of my bean lands with the mazagan bean: they are fit for harvesting three weeks before the tick beans, and give me more time to prepare the land for wheat. I always arrange my pea and bean crops so as to succeed each other, that I may have time to harvest the crops, and till the lands, without much additional force. This is my rotation:—early

hot-

hot-spur pea, an early grey pea, the Spanish dwarf, the Marlborough dun, the mazagan bean, and the tick bean. They come to harvest in the above order; and as the men who work my horses are never employed for any other purposes, I secure a very capital tilth, and a good crop of turnips after my early peas.

My other motive for cultivating the mazagan bean is, that I make them subservient to a crop of cabbages. I drill two rows on a ridge, in the same method as I drill my turnips; in July I take a small furrow from each ridge, and in this shady avenue formed by the beans, I plant the young cabbages; and the beans are off in good time to throw the whole of the land to the cabbage plants, and they are then on the top of the ridges.

I am, dear sir,

Your's truly,

H. J. CLOSE.



## ART. V.

*On rendering Inclosure Bills more simple, and less expensive; to obviate in some degree the want of a General Bill.*

In a Letter to the SECRETARY.

(By BENJ. HOBHOUSE, esq; M.P.)

DEAR SIR, Cottle's-House, Oct. 17, 1798.

I perceive that a part of the last volume of the Bath Society's Papers is occupied by an account of the number of acres of commonable and waste-land, in many of the counties of England and Wales, and a detail of the great advantages which would accrue to the publick by a General Inclosure Act. Neither of the gentlemen who have written upon the subject, not even you, sir, who have shewn yourself so able an advocate for inclosure, can be more sensible of those advantages than myself; but let me ask, is there any chance that this highly-beneficial measure will be speedily adopted by the legislature? I wish that I could answer this question in the affirmative, for then I should delight in the expectation that barrenness would soon be exchanged for fertility, and extensive tracts of unprofitable land soon be converted into verdant pastures, or smiling fields of waving corn; but the pleasing hope must not be indulged.

Sir

Sir John Sinclair, late president of the National Board of Agriculture, at the close of the first session of the present Parliament, brought a bill into the Commons for the purpose of giving a legal sanction to every inclosure, which should hereafter be made by the universal consent of a parish; and conferring upon trustees a power of answering for minors, &c. To this measure, upon a conviction of its reasonableness and utility, I gave my support. After having erased one clause, and modified another, with a view to remove the intended opposition of several members, Sir John so far succeeded, that his bill passed our House without the least discussion. He then imagined that he had surmounted all obstacles; for in his address to the Board at that time, he congratulates the members of it upon the great national benefits soon to be derived, from bringing such an immense number of uncultivated acres into a state of abundant productiveness. But the worthy baronet was too sanguine; he was only permitted to enjoy the pleasures of delusive anticipation; the cup was dashed from his hand, just as he had advanced it to his lips. When the bill was carried to the House of Peers, the Lord Chancellor opposed it by a single remark only: not a word was said in reply; and a proposal, unrivalled in its magnitude and importance, fell to the ground, without the least defence. From this contemptuous treatment of Sir John's bill, and the subsequent loss of his chair, as President of the

Board

Board of Agriculture, which office, it is allowed by all, he had filled with great ability and unremitting attention ever since the commencement of the institution, of which he was himself the founder; I augur, that the endeavours of my friend the baronet, at least, are not likely to prove successful.

At a meeting of the Board on the 8th of May, 1798, Lord Somerville (the new president) points out many schemes, which, doubtless, are very useful; he advises the Board to take a farm, and allot a space for agricultural experiments; he advises the adoption of premiums, which have been so successfully practised by the Bath and West of England Society; but he makes no observation upon the grand *desideratum* of removing, by a General Inclosure Act, the enormous loss which the state and the individual sustain by the immense tracts of waste and commonable lands in this kingdom. Had it been in the contemplation of the Board to have recommended a measure of that kind to the attention of the legislature, the new president unquestionably would not have failed to announce it in his first address from the chair. The conclusion which I draw from this statement, is, that there exists but little hope of obtaining, at the present period, a general law which shall take away the necessity of legalizing every inclosure by a private Act of Parliament; although, in the estimation of very many persons, eminent for their strong sense and profound reflection,

tion, no measure would be more conducive both to private and publick prosperity. Why then should not an attempt of a different kind be made, by which good, though less in degree, may be secured? What prevents many parishes from applying to Parliament for permission to inclose their commons and wastes? The expence of soliciting a bill is too great. This expence is so heavy, that to inclose a parish, unless it be very large, is but to buy land rather cheaply; and to inclose a small parish, is to consume the fee-simple of the uninclosed lands. Let a motion be made in the House of Commons for a reduction of the fees of office; and let it be proposed that two-thirds of them, or any other proportion which may be thought more proper, shall be abated in all cases where the property to be inclosed shall, by a valuation signed by an able and respectable judge of land, such as Mr. BILLINGSLEY or Mr. DAVIS, appear to the Committee of the House appointed to frame the bill, to be worth no more than —. I leave a blank for the sum, because it requires more time to fix it than I can, at present, bestow. The fee to a professional man for such a valuation no parish would be reluctant to pay, because it might probably procure an exemption from a considerable part of that load of fees, usually paid to the publick officers belonging to both Houses of Parliament. Another regulation might come in aid of the former, to render inclosure bills less expensive.

Let

Let the intervals between the sittings of inclosure committees, which are frequently very distant, be shortened. This might be done, and yet leave time sufficient for any intermediate steps which may be judged necessary by the parties; hence the evidence would not be obliged to make so long a stay in London.

If the proposals here suggested were adopted, I am convinced that numerous parishes, which have never conceived an idea of inclosure, on account of the excessive costs and charges with which it is attended, would immediately apply to Parliament for that purpose. Thus a great portion of open lands, which would otherwise lie in their present neglected condition, would be brought into a state of cultivation and improvement; and thus the friends to inclosure would considerably promote the national interest, though not to the extent of their wishes.

It was thought by many, that Sir John Sinclair's motion, to which I have before adverted, was crushed by the powerful influence of those for the loss of whose fees no compensation was provided. If this be true, which I would not be understood to assert, my plan must derive a zealous support from that quarter. The reduction of their fees, in such cases only as those which I have stated, would absolutely augment their profits; parishes, which never could afford to inclose while the expence remains so great as at present, would then become petitioners

to

to Parliament for private acts, and the rate of fees paid on such occasions, however small it might be, would be so much clear gain.

I have now furnished you with a sketch of the thoughts which suggested themselves to my mind this morning, upon the subject of inclosure. You have seen that the plan, the outline of which I have rapidly drawn, cannot be objected to as diminishing the emoluments of office, because it adds to them; neither ought it to startle the timid as an innovation, for it leaves the law untouched, and is no more than a salutary regulation. Do me the favour to present it to the Society. Although it may not be deemed a proper basis for an application to the legislature, yet, by exciting inquiry, it may give birth to some wiser and better scheme for rendering private inclosure acts less expensive. I fear that, at the present period, no reasonable hope can be entertained either of a General Inclosure Act, or, of what would be still more useful, an act for substituting adequate salaries in lieu of the fees of Parliament, which certainly operate as a prohibition upon national improvements.

I am aware, sir, that communications of a practical kind are more valuable than my speculations; but as they aim to alleviate the weight of those obstructions which now impede the progress of agriculture, it occurred to me that there was no impropriety in communicating my sentiments to the Bath

and

and West of England Society, of which I am proud to call myself a member, because the object of its pursuits has a direct tendency to increase the population, strength, and happiness of the country.

I am, dear sir, your's, &c.

B. HOBHOUSE.

[N.B. The foregoing sketch of a measure, as a substitute for a General Inclosure Act, (now but little expected) was so highly thought of in the Committee of this Society, that no hesitation arose on the propriety of thus throwing it before the publick.—It is much to be wished, that those readers who are Members of Parliament, and gentlemen who may be intimate with Members, and who heartily approve the sketch, would endeavour to mature it into efficiency. From the continued endeavours of this Society, to promote the progress of a General Inclosure Bill, some flattering hopes of success were entertained. And if ever unanimity of opinion, among a body of respectable gentlemen, on a point which they were peculiarly qualified to judge on, gave reasonable ground of hope that they would be attended to in Parliament, surely they were warranted in their expectations. Their second petition, signed by about 150 members, having been presented in vain, or apparently so for the present, has been considered as discouraging. And though that best of all measures for the prosperity of agriculture may be reserved for the patriotism of a future period, *this* humble substitute, good as far as it goes, may possibly, by due perseverance, be carried.]

ART.

## ART. VI.

*Further Reflections on Commutation for Tithes.*

(By Mr. PRYCE.)

To the SECRETARY of the Bath and West of England Society,  
for the Encouragement of Agriculture, &c.

SIR,

Park-Street, Bath, Jan. 8, 1799.

I Observe in the eighth and last volume of the Society's Papers, an essay on the most practicable mode of giving an equitable compensation for Tithes, to which the Society's prize was adjudged. The ingenious author, Mr. DAVIS, has taken notice of an essay on the same subject, written by me in the year 1786, which was then honoured with a prize by the Society, and is published in the fourth volume of their Papers. As this subject is thought of great national importance, and expected to be taken up by the legislature, I trust that a few remarks will not be unseasonable, in addition to what I have before written.

In my former essay I examined various modes of compensation, and submitted to the Society that a rent in money is the most eligible; subject, however, to be varied once in ten years, according to the average price of wheat during that period. This plan has, in substance, on the inclosure of common fields,

fields, repeatedly been adopted by the legislature; and is in part adopted by Mr. DAVIS. He has considered a rent in money as most eligible, he has adopted wheat as one article for varying the rent, and referred to my essay for the mode of carrying commutations into effect:—But he has materially differed from me in also adopting barley, oats, and butter, as standards for varying the rent; and in proposing that such variation should take place every year, and be governed by the average price of those several articles the preceding year. Mr. DAVIS is of opinion, that hops, hemp, flax, &c. should pay a certain price per acre, to be fixed by the legislature; liable, nevertheless, to rise and fall with the price of corn. As it is presumed the Society would not have adjudged their prize to this last essay, had they not considered the deviations from my plan as material improvements, I trust that I shall be favoured with an opportunity of stating in your next volume, my reasons for being of a different opinion. It seems to be a duty incumbent on me to do so, being firmly persuaded, that should the author's plan be carried into effect, it might operate very differently from what was intended, and be productive of much injustice.

The principle laid down in Mr. DAVIS's essay, (p. 249) that, “No commutation for tithes can be called a fair equivalent, which is not so settled as to fluctuate with the rise and fall of every commodity

“modity subject to tithes, &c.” is not, I think, well founded; because, the rise and fall of commodities is generally occasioned by the plenty or scarcity of them in market. It would not therefore be equitable, that the rents of tithes should be lowered by particular years of great plenty, when the increased quantity makes amends for the decreased price; and it would be equally unjust, that those rents should be advanced in consequence of high market-prices, occasioned by years of general failure and scarcity. It seems, then, that the rents of tithes could not be equitably varied every year, by the market-prices of various commodities the preceding year; unless the quantities raised of those commodities could be ascertained.

In converting land to its proper use, the farmer does not speculate on the chance of seasons only, but on the prospect of his commodities finding a ready and profitable market. It has been stated, by that excellent author Dr. ADAM SMITH, in his celebrated inquiry into the nature and causes of the Wealth of Nations, that, “ The quantity of every commodity “ which human industry can either purchase, or pro- “ duce, naturally regulates itself in every country, “ according to the *effectual demand*.” If the effectual demand be not foreseen, an effectual supply cannot be expected; and it would scarcely be equitable, that the rents of tithes should be regulated by uncertain commodities, which the landholder does

not

not cultivate. It seems, then, that the articles to be chosen should be of such consequence, and indispensable necessity, as to make the demand for them general, steady, and uniform. They should not be liable to monopoly, by which artificial scarcity may be raised; they should not be the raw materials of a manufacture, variable in quality, or the price of which would be affected by combinations, arbitrary profits, fashion, or taxation. They should not be articles of commerce, the demand for which would depend on sudden or uncertain orders from *without*, for which the husbandman cannot properly provide; nor should they be articles of luxury, the value of which would be governed more by the caprice of the wealthy, than by the real wants of the most useful part of the community.

As the articles to be fixed on for regulating the rents should not be liable to great uncertainty in the demand, so also they should not be peculiarly liable to uncertainty in the produce or supply. Commodities which depend much on particular soils, or seasons, will not be generally cultivated; and where cultivated, it would be hard that such failing crops as would scarcely pay a cultivator for his trouble, should, by enhancing the price at market, raise the rent of his tithes for the ensuing year.

Mr. DAVIS seems to have foreseen the difficulty of regulating the rent by all the commodities subject

to tithes. Let us consider whether those which he has adopted, are proper for the purpose.

### BARLEY.

IF we examine into the uses of Barley, we shall, I think, find that it does not possess sufficient requisites to entitle it to be a representative of other commodities. The great demand for it, and advanced price, does not generally originate in the real wants of the people, but in circumstances changeable and uncertain in their nature. It is the raw material not only of a wholesome beverage, but also of an article of luxury, which produces intoxication, and its attendant evils. Its product is liable to monopoly, arbitrary profits, and taxation in various forms. Vast quantities are consumed in the distilleries, and its price is greatly influenced by circumstances which the grower cannot foresee, nor meet with an adequate supply. It is influenced by a scarce or plentiful year of apples for cyder, and by the uncertain demand for exportation, in all its different states, and products; as also by the importation of wine, and foreign spirits.

It appears by Mr. KENT's Agricultural Survey of the county of Norfolk, that on an average of the three last years, in that single country, the excess of barley and malt exported, over and above that which was imported, amounted yearly to no less than 450,651 quarters. The time may arrive, when at

tides

ticles of commerce and luxury must give way to those of necessity; and when so great a quantity of land will not be employed in raising this commodity.

If we turn to Mr. DAVIS's valuable Survey of the county of Wilts, we shall find it there stated, that great as the occasional demands are for barley, it is not a crop to be generally depended on. Speaking of clays, and of chalky loams, (page 46) Mr. DAVIS remarks, that, "In case of a wet sowing-time, the crop scarcely re-produces the seed sown, and the grass-seeds sown with it come to nothing. That this is frequently the case—and that for this reason, wherever arable fields have been laid in severalty, the almost exclusion of barley crops on the strong, heavy lands has been the consequence."

Again, (in page 76) he gives strong reasons against depending on barley as a productive crop, either on the white land, or on a sandy soil; and these, amongst other reasons, seem to militate forcibly against making it a standard for regulating the rents of tithes.

### OATS.

IF Oats are proper for regulating the rents of tithes, it must be in those parts of the kingdom only, where they are regularly cultivated, and used as one of the necessities of life. The general demand for this article does not, however, arise from the necessities of the people, but from the number of horses kept for pleasure, war, and business. The two first

classes will be affected by the politicks of government, in having a greater or less military establishment, and by the taxes which may be laid on the useful animal, and the carriages he draws. The number of horses kept for agriculture, and for the conveyance of commodities from place to place, may be considerably affected in various ways:—by encouraging the use of oxen; by improvements in implements of husbandry, and wheel-carriages; by the extension of navigable canals; and by the state of the publick roads. To this may be added, the consolidation of small estates; which, Mr. DAVIS remarks, “ has tended very much to reduce the number of horses;” and produces an instance, where, on fourteen yard-lands, of 40l. a year each, there were twenty-seven horses kept, fifty years ago, *more* than there are at present.

The demand for the oat crop is not only liable to be affected by future contingencies, but the growth of this article does not, in general, come into a regular course of crops. Bad farmers will sow them when the ground is so exhausted as to be incapable of bearing any thing else. Mr. DAVIS observes, that “ oats are seldom sown in very great quantities but “ in such soils and situations as will not bear barley; “ that even where they have a regular tenantry out “ field, the farmers look upon the cultivation of them “ to be bad husbandry; and will frequently forego “ the crop, to give an additional year’s rest to their

“ wheat

“ wheat lays.”\* He doubts, whether there are not more consumed in the district he speaks of, than what grow in it. In many districts of the kingdom this is actually the case, and the supply arises from importation.

It is stated, in Mr. KENT’s Survey of Norfolk, that on an average of three years, in that county only, the excess of oats imported, over and above those exported, amounted yearly to no less than 15,389 quarters.

On due consideration of what has been written, it will, I think, appear, that oats and barley do not possess the proper requisites for regulating the value of all the different productions, on two-thirds of the arable land throughout the kingdom.

### BUTTER.

Mr. DAVIS has adopted this article as a regulator of the rents of tithe, on all the grass land in the kingdom. He considers butter as a “ commodity of a constant and invariable quality, and of daily, regular, and indispensable consumption in quantity, “ on the price of which every other production of “ grass land in a great measure depends.” Other agricultural surveyors hold a different opinion.

Mr. TURNER, in his survey of Gloucestershire, accounts it an article not strictly necessary; and Mr.

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\* Survey of Wilts, page 46.

BISHTON, in his survey of Shropshire, expressly treats it as an article of *luxury*.

In whatever light the Society shall please to consider this commodity, it seems to have but little influence on the prices of various other valuable productions of grass land. There seems to be but little connection between the price of butter and the prices of wool and lamb, which are seldom produced, in considerable quantities, on land fit for the dairy; nor is the demand influenced by similar causes. The price of hay is determined more by the length and severity of the winter, than by the price of butter. Hay must be had for the support of valuable animals; butter may be dispensed with, or the quantity lessened. Abundant rains in harvest, which spoil the hay, or destroy it by flooding the low lands, will make this article scarce and dear: the same cause, by producing a great quantity of grass, may make butter cheap. Even the prices of other products of the dairy do not necessarily seem to be governed by the price of butter; for, in speculating on the different profits of those products, the less milk is converted into butter, by which that article may become dear, the more will remain for cheese, calves, and to consume in its original, and perhaps most wholesome, state; by which those articles may severally become cheap. The true value, or fair price of butter is liable to be warped and affected in a variety of ways. It is affected by different seasons of the year, by the

refort

resort of genteel company to fashionable places, by the importation of Irish butter, and by monopoly and combination. The inconsiderable quantities of it brought to market, and sold out in small portions, seem to make it particularly unfit for regulating the price of every other production of grass land.

It must have occurred to every accurate observer, in common with the late ingenious Mr. WIMBURY, that most markets are supplied with butter by such *little dairies* only, as are thought "below the notice" of the wholesale dealers.

The same valuable correspondent mentions, in the 4th vol. of the Society's Papers, (p. 149) some curious facts, which prove to what an extent butter is monopolized for the London market, at the distance of 150 miles from it. He quotes a valuable paper of Mr. BILLINGSLEY's in proof of his opinion, to shew how much the produce and prices of dairy articles are varied by local circumstances; and concludes, that, "there is no article in the large circle "of commerce that is so much the subject of those "pernicious arts," (forestalling, engrossing, and re-grating) "as butter and cheese."

Whether the price of butter has kept a regular progressive proportion with the price of the land from which it arises, as stated by Mr. DAVIS, is much doubted. I have reason to believe, that it has advanced in a higher ratio.

The

The introduction of artificial grasses has made meadow and pasture land less valuable, *in proportion to arable*, than it was in the last century; when they were obliged to trust to grass land only for the support of their stock. It has been remarked, that most of the improvements in the present century have been made by the plough.—If we except small quantities of grass land improved by irrigation, or by draining, and that which lies very near to towns, where population increases, the price of grass land has not in fact advanced in proportion to that of arable; and very short indeed of the proportion in which butter has advanced, which, within half a century, has in most places doubled, and in some places trebled.\*

If it be proper to fix on any standard for regulating the rents of the tithe of grass land, distinct from arable, it does not seem then that butter is an article well adapted for the purpose. I am not, however, convinced either of the necessity or propriety of such distinction. The conversion of grass land to arable, and arable to grass, which is constantly taking place, would probably make this complicated distinction, if equitable at present, not so in future; and the mixed claims which the rector and vicar frequently have upon the same land, is an additional reason for simplifying the standard as much as possible.

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\* Mr. BISHTON'S Survey of Shropshire.

I am equally unfortunate in differing from Mr. DAVIS, whose general sentiments on rural matters I highly approve, by thinking that the rent of tithes, when once fixed, ought not to be disturbed every year. What the celebrated Dr. SMITH has said on taxes, seems equally applicable to the subject before us, viz. "The certainty of what each individual "ought to pay is a matter of so great importance, "that a very considerable degree of inequality is not "near so great an evil, as a very small degree of "uncertainty."

There can, I think, be little doubt, that it would be more equitable, and more desirable, both to the landholder and tithe-owner, that the one should know his expenditure, and the other his income; and that, when a fair rent was once fixed, it should remain for a term, and not be disturbed every year by complicated calculations, drawn from the prices of various commodities; the nature of which, and the contingencies they are liable to, subject them to so much error and uncertainty.

*The Rent of Tithes*, like that of the land out of which they issue, should, as I conceive, be regulated not by the temporary and occasional, but by the usual and average price of the produce; or, of the most general, steady, and important parts of it, which influence the price of other articles. It is not the price in market only, of any or every commodity which is brought there, that ought to be regarded.

The

The profit of the farmer is compounded of the prices, and the quantities, of such commodities as he is enabled to carry to market. The tithe-owner is more interested that his rent should enable him at all times to purchase a certain portion of the necessaries and conveniences of life, than he is in the market prices of commodities which he does not want; and which prices, arising from the extent of the demand, and the quantity of the supply, cannot determine the farmer's profit, nor the sum the tithe-owner would have been entitled to, had he taken his tithes in kind. The money received as rent by the tithe-owner may be considered as an instrument of exchange, by which one article is bartered for another. It not only represents the product of the land, which he would have been entitled to, but is also the representative of every other article which he must purchase in order to sustain life, and make it comfortable. Let us endeavour to discover the great machine, by which all these articles are produced, and the means by which it is kept moving.

It is an axiom in politicks, that the riches of every nation consist in the number of its inhabitants, usefully employed. Dr. A. SMITH, the celebrated author before quoted, lays it down as an incontrovertible maxim, that, " The annual labour of every nation is the fund which originally supplies it with all the necessaries and conveniences of life, which it annually consumes; and which consist always either

“ either in the immediate produce of that labour,  
“ or in what is purchased with that produce from  
“ other nations.”

“ Labour (he says) is alone the ultimate and real  
“ standard, by which the value of all commodities  
“ can at all times and places be estimated and com-  
“ pared. It is their real price. Money is their no-  
“ minal price only.—Again, labour, it must be always  
“ remembered, and not any particular commodity,  
“ or set of commodities, is the real measure of the  
“ value both of silver and of all other commodities.”\*

This leads us to enquire, what is it that principally influences and determines the value of labour? The answer seems to be, the wants of the labourer.

In what do these wants consist? The most pressing and indispensable is *food*; after which may be reckoned, in our climate, clothing, firing, and a habitation; but these are not *equally* indispensable with the former; nor are they applicable to our present purpose. **HUMAN FOOD** is the great mover of the vast machine *labour*, which regulates the value of all its productions, and of all the necessities and comforts of life. “ Human food,” also, as it is remarked by the excellent author before quoted, “ seems to be the only produce of land which *always*, and *nece-  
sarily*, affords *some* rent to the landlord; other sorts  
“ of produce sometimes may, and sometimes may

\* *Wealth of Nations*, vol. i. pages 1, 39, and 234.

“ not,

“ not, according to different circumstances.”\* Human food is the article for which the demand is universal and constant, and an adequate supply is perpetually called forth, by every principle of policy and self-preservation. It is this article which arises from the land itself, is the great source of its value, and regulates the value of labour, and ultimately of all the necessaries and conveniences of life; and it is from this alone, I conceive, that we can form a proper standard for measuring and adjusting, by the medium of money, the value of those products of the land which the tithe-owner is entitled to, with those that he shall find requisite for his well-being.

The food of man consists in vegetable productions, and the flesh of animals. I do not mean here to inquire, whether animal food would properly form part of a regulating standard, for varying the rents of tithes. An investigation of the subject was attempted by me, with an intention to submit the result to the Society, but circumstances arose which prevented me.

In my former essay, I considered vegetable food as of the greatest consequence; and that some parts of it are abundantly more important than the rest. Whatever the earth may produce in the vast and fertile empire of China, if the rice crop fail, all the horrors of famine ensue. Bread-corn is of equal importance to the people of Europe; in which, as it

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\* *Wealth of Nations*, vol. i. page 202.

is remarked by the celebrated Dr. TISSOT, "There is not the smallest province, except part of Lapland, where corn is not the basis of their nourishment." He adds, that, "Of all foods, *wheaten bread*, well made, is the most wholesome."\* The importance of bread-corn to this country was sufficiently evinced in the year 1795. The scarcity then arose at a time when there was no want of animal food, and the earth yielded other vegetable food in abundance; yet the dread of wanting this *one article for a few weeks only*, previous to the corn harvest, spread an universal gloom throughout the nation!

It is not because wheat is *one* of the principal productions of the land, that I have, in my former essay, chosen it for a standard. It is on account of its being *an indispensable necessary of life*; the price of which, as it is in various places remarked, by the excellent author of the Wealth of Nations, "regulates that of all other commodities.—It regulates the money price of labour, which must always be such as to enable the labourer to purchase a quantity of corn, sufficient to maintain him and his family."

It is not meant that labour, or the produce of labour, rises and falls with the market-prices of corn, as those prices fluctuate from day to day, nor perhaps from year to year; but the price of this article,

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\* Letter to Dr. HIRZELL, of Zurich, on Bread-Corn.

taken

taken on an average of years, principally stamps the value of money, and of every production of human industry. It may here be questioned, whether the wages of the indigent labourer have, in fact, advanced in due proportion to this article; if not, what is the reason? The hind, who tills his native soil, is perhaps more attached to the place which gave him birth, than men of more liberal and enlarged notions. From his needy circumstances, and dependent situation, he is less capable of obtaining the proper value of his labour; especially when dealing with men whom he looks up to for relief in distress. His parents, perhaps, have been supported by the same parish, where he has gained a settlement by birth or servitude. He forms an early attachment, and marries; his attachments, and the laws of settlement, fix him to the spot where he is forced to accept of the same wages, or nearly so, as his father received before him. In those countries where the farmer feeds his labourers, as a part of their hire, or sells them corn, when dear, at a reduced price, there is indeed less reason for an advance. In scarce or inclement seasons, benevolent subscriptions also, in this country, are always ready to aid poverty in distress. Where the labourer has not these advantages, he generally rests satisfied that the parish must assist him in bringing up his family; and it is a matter of indifference whether he receives part of his wages from the poor's-rates, or from those whom he serves.

Hence

Hence it is, that whilst the nation is rich in arts, manufactures, commerce, and agriculture, the poor's rates are in many places doubled, which is nothing more than a gradual advance in the price of labour, nicely adjusted to the average price of food; with this difference, that the labourer receives that advance from the parish, which he ought to receive from the hand of his master.

This circumstance, then, does not disprove the general principle laid down by Dr. SMITH, that, "The money price of labour, and every thing that is the produce either of land or labour, must necessarily rise or fall in proportion to the money price of corn.—Corn accordingly is, (he says) in all the different stages of wealth and improvement, a more accurate measure of value than any other commodity, or set of commodities. (And that) In all these different stages, therefore, we can judge better of the real value of silver by comparing it with corn, than by comparing it with any other commodity, or set of commodities."\*

Such is the opinion of that most judicious writer; and upon such grounds wheat has been recommended, and adopted, as a standard. This standard appears to have been deserted by Mr. DAVIS, or its principles abandoned, chiefly on account of the policy of government in framing the corn-laws. "The

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\* Wealth of Nations, pages 94 and 234.

" effect

“ effect of this policy (he remarks) has been such,  
 “ that the price of wheat has been very little higher,  
 “ on an average of the last twenty years, than it was  
 “ on an average of the twenty last years of the last  
 “ century.”

There was, indeed, a considerable period in the last century when not only wheat, but “ all the different sorts of grain,” and eatable vegetables, such as potatoes, turnips, carrots, cabbages, &c. were dearer than they have been for great part of the present century. Even butcher’s meat was dearer in the former part of the last century, than it was as late as the year 1764. The corn-laws could not operate upon all these different articles, nor upon the different countries, to which the dearness extended. For it is said to have extended to Scotland, before the union of the two kingdoms; that it was the same in France; and Dr. SMITH adds, “ probably in most other parts of Europe.”\* This general dearness, during part of the time, is supposed principally to have been owing to the badness of the seasons. Other causes are also assigned. The civil wars, which disturbed the peaceable occupation of the husbandman, and, in this country, a degradation of the silver coin, by which the true value of corn could not be measured and adjusted with the value of labour; “ a guinea then commonly exchanging

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\* Wealth of Nations, pages 93, 95, and 189.

“ for

“ for thirty shillings of the worn and clipped silver,”\* with which corn and other provisions were purchased. The decreased price of corn, during great part of the present century, is so far from being attributed to the corn-laws, that the ingenious author of the *Wealth of Nations* is of opinion, that the operation of those laws has been directly the reverse.

In page 248, after reasoning on the effects of the bounty, he concludes thus, “ If during the sixty-four first years of the present century, therefore, the average price has been lower than during the sixty-four last years of the last century, it must, in the same state of tillage, have been much more so, had it not been for this operation of the bounty.”

I have little doubt, that a more vigorous cultivation, and the bringing a great quantity of rough, unprofitable land into tillage, have had a full share in lowering the price of grain, during the period alluded to.

Suppose we quit the comparison by *centuries*, and take *half a century* only; as a period fully sufficient to mark the operation of an *Act of Parliament*, or examine the chain of causes and effects. It will appear, by the treatise on the *Wealth of Nations*, (p. 325) that, on an average of the last ten years of the last half century, the best or highest-priced wheat sold for about 3s. 9d. per bushel only. It is

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\* *Wealth of Nations*, pages 242, 243, and 244.

doubtless in the memory of most members of the Society, whether the average price of wheat, for the last ten years, has not as much exceeded 3s. 9d. per bushel, as the prices of land, labour, and the necessaries of life in general have advanced, notwithstanding the operation of the corn-laws. Those laws seem to operate equitably on the standard, by preventing the tithe-owner's income from being considerably lowered by years of plenty, and the farmer's rent from being considerably advanced by years of scarcity; but their operation is not always sufficiently quick to prevent enormous prices from being given. In the year 1795, many small farmers (in common with others) purchased corn for their families, when the current prices of wheat in several parts of the kingdom were from 13s. to 17s. per bushel! How would such prices operate, in fixing the rents of tithes throughout the kingdom, by taking the fluctuations of the markets for a *single year*?

Admitting, that in process of time the present regulations of the legislature, as to the prices at which exportation shall cease, and importation commence, should be found to discourage the culture of wheat; still, an act of the British Parliament is not eternal. The legislature is always competent to make alterations, and further regulations would of course ensue; for it cannot be for the interest of this country to depend on the precarious aid of a foreign supply, in an article so essentially necessary to the very *existence*

of the people. It will however, I hope, not be forgotten, whenever such regulations shall take place, that, as bread-corn in great measure determines the value of labour, and of every commodity produced by human industry, it is of the utmost importance to the manufactures and commerce of this kingdom, that it should not be purchased at an *extravagant price*. If this essential necessary of life, which influences the price of labour and all its productions, should be much dearer here than on the continent, we should probably be rivalled and undersold at foreign markets. It might not be improper also to remark, that, whenever any regulations shall be brought forward by the legislature for bettering the condition of the poor, it will, in the same point of view, be much sounder policy to endeavour to lower the price of provisions, than to advance the price of labour.

I have now attempted to explain the *principles* upon which my former essay was founded; and am firmly of opinion, that they are the true principles upon which rents once fixed should vary.

I have endeavoured to shew, that particular years of plenty, or scarcity, influence the market-prices of commodities; and that such prices, taken for a single year, would operate very inequitably in varying the rents of tithes.

I have examined whether barley, oats, and butter, are proper regulating standards for varying those rents; and have submitted my reasons to the Society

for concluding that bread-corn, as the most indispensable *necessary of life*, which regulates the price of labour, and keeps pace with the value of money, is much better adapted to the purpose.

Finally, upon a careful investigation of the operation of the corn-laws, it appears, I believe, from indisputable authority, that they have not produced the evils complained of; but, on the contrary, are well calculated to counteract the effects of particular seasons, and have proved beneficial both to the ~~hus~~ bandman and the community.

I am, sir,

Your very humble servant,

BENJAMIN PRYCE



## ART. VII.

*On the Culture of FURZE.*

In a Letter to the SECRETARY.

[By JOHN HARVEY PIERCE, esq.]

DEAR SIR, New-Park, June 20, 1797.

ONE of the subjects which appears to me to merit some consideration, is, the cultivation of furze, as a *winter food* for horses. Having remarked a hardy little horse, which I occasionally rode, bite off the green tops of furze in preference, I thought, to dry meat, (hay) it occurred that such was certainly wholesome, and, perhaps, might have qualities superior to what its rough appearance indicated. I was the more pleased with the idea, from recollecting the attempts of Mr. WHYCHERLY being so far successful as to introduce (through Mr. ROQUE's means) the use of burnet. I turned the matter over in my mind, but was at a loss how to proceed; when soon after, in a collection of miscellaneous papers, published by R. MAXWELL, esq; of Edinburgh, meeting with the passages transcribed and annexed, I was fully convinced, that it might not only be used as a wholesome, but very nourishing food; and although, perhaps, not quite so good, in many respects, as some roots and plants generally known, yet from the cheapness, might oftener come within

within the power of little farmers to procure, than most other sorts. Strongly impressed with the idea of its utility, I tried it, but was disappointed—more I thought, from my own inattention than any other cause. Not having a good opportunity of repeating the trial, the matter lay dormant till the winter 1795-6. In the autumn preceding which, on mentioning the subject to a neighbour who occupied a small farm, I was agreeably surprised at his acquainting me, that he had kept four horses on the tops of furze during the winter of 1794-5. Determined now to give it another trial, I hired a stout girl at 2s, a week, to cut the green tops of some old furze, growing on a hill about a quarter of a mile from the house, and bring them in bundles on a pole to a spare stable, which I prepared for the purpose of cutting and threshing the furze; here it was cut from an inch to two inches long, with a cleaver like what the butchers use, and afterwards the spines broken with a flail. My threshing floor was a temporary one, of six or seven oak boards, pinned down to four joists, layed on the pavement. A bushel basket of the furze thus prepared, was allotted to each horse every morning instead of corn; but, I believe, three horses had generally only two baskets; not because it was considered as sufficient, but owing to the tediousness of cutting and threshing, and sometimes from hindrance of bringing in, by bad weather; perhaps too, from not being used to the work, and now and then

a little

a little idleness, when not looked after. I ought, therefore, strictly speaking, to say, that with two bushels three horses worked in every respect as usual, though without any corn. This food, with hay, was continued till the middle of May 1796, when the horses were put to grass. I hope it will not be trespassing too much on your patience by relating the state of the three horses. One, used for the shafts, is a young, strong, and healthy gelding; the other two are old mares, and generally used as leaders to oxen, which commonly draw in harness. One of the mares the preceding winter (1794-5) was very short winded; this, (1795-6) while eating the furze, breathed quite free and easy. She was with foal. The other mare in winter, had always swelled legs; in this of 1795-6, her legs continued as they had been the summer before—not in the least enlarged. It was (what is here called) the French furze which I used, and only the tender green tops thereof. The woody part, and even those which were brown, were rejected.

If this rugged plant should on trial, in its *wild* state, be found to merit more attention than has been generally allowed, it may be thought that good ground, well prepared, and with implements adapted to cutting and grinding or bruising it, with a regular and judicious mode of using, would render it of more importance than a few trials without such aids could possibly lead us to suppose.

Should

Should the foregoing be thought to deserve the consideration of any gentleman, more conversant with the nature, preparation by *mill*, and use of furze, than I am, there can be no doubt of his readiness to communicate such information. If any one should be inclined to try the best mode of culture and use, perhaps he would prefer the French furze. To sow, as near the stables as convenient, some broadcast—some in drills, at different distances, and hoe it; to cut it under a year's growth; to have a light skeleton cart for conveying, and a *mill* of *simple* and cheap construction to bruise it. Perhaps an acre of such furze ground might be found of more value, as producing a healthy, cheap, and hearty food for cattle during winter, than many other crops now in general use. Perhaps too, a comparative trial with carrots, potatoes, parsnips, &c. might not be useless.

If a model of a mill for breaking the spines cannot be easily obtained, perhaps an original, cheap, and simple one may be constructed with two wooden cylinders grooved longitudinally, the ends cogged, and turned by hand with a winch like the common apple-mill.

I remain with much esteem, dear sir,

Your very humble servant,

JOHN HARVEY PIERCE.

[P.S. This Society has a model of a mill for the purpose aforesaid, which is constructed on the principle of the common one, for bruising bark, woad, &c. &c.]

PAGE

PAGE 317. " *Lord Cathcart's Letter to the Agricultural Society in Scotland.* "

" THE sowing of whins for feeding of cattle takes  
 " mightily about London now; the thin dry soil, that is  
 " good for nothing else, they manage in the same way as for  
 " sown grass; but, in place of that, they sow it in the spring  
 " with whin seed. They mow the whins that summer,  
 " and continue to do so yearly thereafter. They reckon  
 " one acre produces at the rate of ten loads or ten tons,  
 " 20 cwt. each; this they stack up. They have a contri-  
 " vance for chopping them, and they commonly cut at  
 " once as much as serves their cattle for two days; a gen-  
 " tleman who has tried them, assures me, that all his horses  
 " of every kind, as well for draught as for riding, eat them  
 " as readily as they do hay; and he thinks them as good  
 " feeding. This improvement comes from Wales, where  
 " it has been practised these hundred years."

PAGE 319. " *Directions by Major Henbury, in Wales,  
 " for sowing Whin Seed, and using the Whins, com-  
 " municated to the Society by General Abercromby,  
 " of Glassock.* "

" THEY should be sowed in February, March, or  
 " April; 6lb. will sow an acre. The place where they are  
 " sowed must be made very free of grass, and all sorts of  
 " cattle must be kept out. One acre will produce fifteen  
 " tons, which will feed as far as fifteen tons of hay. The  
 " time to begin to cut them is in October or sooner. They  
 " will continue to grow till Christmas, and be fit for use till  
 " March. When you give them to the horses, they must  
 " be bruised by a mill, or otherwise be pounded, and given  
 " in a day after they are bruised; if you give any chopped  
 " straw

“ straw with them it will do very well—a hundred of straw  
 “ will serve for a ton of furze. The furze must be cut,  
 “ only what is the growth one year, beginning in or before  
 “ October. The Major has fed sixteen horses with them  
 “ from October to March.”

## ART. VIII.

*Account of the TURNIP CABBAGE, with directions  
 for its Cultivation.*

[By the Rev. THOMAS BROUGHTON.]

THE turnip cabbage is a plant little known in this kingdom, but as a vegetable for the garden, and rarely cultivated, even for that purpose. An attempt was made many years since by the Society of Arts in London, to introduce it as an article of husbandry; but though the report of the experiment made for that purpose was highly favourable, it afterwards fell into disuse. I became first acquainted with it about six or seven years since, when a few seeds were given me in the month of July, by a person of Bath, under the name of Cape Cabbage. Sown so late the plants did not bulb, but the strongest were planted out, and the seed saved the following year; from whence all I have hitherto cultivated have been produced. I have uniformly found them a most excellent food for sheep, and have given them with great advantage to cows and horses.

This

This plant differs very much from the *Turnip-rooted Cabbage*, that plant bears its bulb *under* the surface of the ground, and its leaf more nearly resembles that of the common turnip; whereas the turnip-cabbage produces its *bulb above* the surface of the ground, which bulb is in fact an *enlargement* of the stalk, surrounded with leaves, nearly resembling those of brocoli. It delights in a dry, elevated, and rather light soil. The seeds may be sown at any time from the end of March to the middle of May; and even later, if not intended to be transplanted. They must be sown very thin, and the plants thinned out to about three inches asunder. The best method is to prepare a part of the land, intended for the crops, as early as possible for the seed-beds, by which means you can conveniently allot good room for those beds, and will save the trouble and expence of carrying them from the garden to the field. When the land is prepared, (which should be done nearly as for common turnips) and the plants in the seed-beds are from five to seven weeks old, let it be ploughed in small two-bout ridges, let a light roller follow the plough, to flatten the tops of the ridges, and let the plants be immediately put in as nearly as possible in the middle of the ridges, about three feet asunder; observing not to plough more ridges than will be planted in the same day. The stouter the plants are in reason when transplanted, the better. The land must on no account be ploughed

when

when *wet*, as the plants put in under such circumstances never thrive. When the plants have taken firm root, and the weeds begin to appear, let a furrow be struck from each side of the ridges, with a plough narrow at the tail, and the ground not moved by the plough be hand-hoed. When the weeds are perfectly withered, before the plants are too large, let the furrow be returned to its place, taking care not to throw the earth over the hearts of the plants. This operation may be performed more than once, if found necessary.

The best time for feeding off the crop is from the middle of March to the latest possible time the land can be spared. The sprouts may be cut off even when in blossom, and left to wither for the sheep or cows, and the bulbs cut and carried to a barn or shed, where they may be preserved for a long time. When a little withered, they are very good for horses, being highly nutritious, and free from acid juices. If sown early, they might be fed off late in the autumn; but, perhaps, not so profitably as in the spring. They should be hurdled off for sheep, as common turnips. It seldom happens that hay need be given with them, even to fat sheep, which have always been found to thrive more and faster upon them, than upon any other food whatever, except corn.

THOMAS BROUGHTON.

*Redland-Parsonage, \*\*\*\*\* 1797.*

## ART. IX.

*On the Cultivation of Potatoes from the Rind, &c.*

In Letters to the SECRETARY.

(By the Rev. EDWARD WHITTLE.)

SIR, *Odstock, near Salisbury, March 14, 1796.*

AS information, whether it be the result of scientific researches, or that of a more simple nature, founded upon experience and well attested, has always been thought advantageous to the public; I have ventured to send to you (for the perusal of your respectable and very useful Society) the following letter; and if it should at all tend to the good of the community, my end will be abundantly answered. And further, if the Society should be of opinion that it may, they are at liberty to publish it, with my name and place of abode.

Perhaps, amongst all the various kinds of information, there may be times and seasons, when that which is the most simple may be of the most general use, because it can be more easily and more effectually communicated; and by every description of them, with greater facility, carried into practice.

Notwithstanding the considerate goodness of the Society, in informing the publick of the cheapest method of raising potatoes, and at this time to plant more than usual, the growers of that useful root are, in general, so bigotted, or rather wedded, to their

old

old method of doing things, that it is with the greatest difficulty they can be prevailed on to make improvements, although it would certainly tend to their own and the general good; and rendered quite certain by experiments already tried. It is in consequence of conversation with men of this description, that I am induced to trouble you with this letter, men who would not be convinced to the contrary, but that the decaying potatoe afforded so much more nourishment to the green which sprung from it, than could possibly be afforded from a piece of rind, as would render the crop much more abundant; and affected to disbelieve what was inserted in the *Salisbury Journal* by your Society, because the persons' names, who made the experiments, were not inserted. However, having been in the habit of planting potatoes for these 15 or 16 years past, I have been induced to make the following experiments:

In the year 1790, I planted a large square of potatoes, one-third of which was *with the rind*, one-third with *whole potatoes*, and the other part with *pieces*, cut in the usual way; and I assure you, when the season came for digging, there was not the least visible difference in the produce.

The following year, I planted in the same row or drill, one whole potatoe, one piece, and one piece of rind, in which there was an eye, alternately; and when the season came for digging, I was very careful in my observation, but unable to perceive any difference in the crop.

In

In the year 1793, when the servant was digging up my potatoes, besides those fit for eating, I discovered a great number about the size of a walnut, and from that to a hazel nut, which I ordered to be left in the ground. In the spring of 1794 my two potatoe beds were irregularly covered with greens, which sprung from these small potatoes; I therefore prepared, about the middle of April (for, on account of the coldness of the land, I have always had the best crops from potatoes planted at that time) two other beds, about the same size, into which I transplanted these greens; about 1-third of which had the seed hanging to them, and about 2-thirds had not, having dropped off in drawing; with these I planted one bed and an half, and made up the other half bed partly with whole, and partly with potatoes cut in the common way, some in drills, and some planted in holes made with a setting-stick; and I have to state, that we were as exact as possible (without weighing or measuring) in our observations, and we could not discern the least difference in the production; and the crop, to all appearance, was quite as good from the shoots as from the whole or the cut potatoe; and I am convinced, there is not the least necessity for planting the potatoe, in order to raise a crop; as the rind, or shoots, will produce one equally as good. The reason which induced me to make out the remaining half bed with whole and cut potatoes, when I before was satisfied that the rind would answer the end, was, that if I had told my neighbours that the shoots produced as good a crop as the rind, and the rind

hind as the shoots, they would have replied, " that  
" is very probable, but if you had planted whole, or  
" cut potatoes, your crop would have exceeded  
" ther!" — With my best wishes for the prosperity  
of the Society,

I am, sir, your obedient humble servant,

EDWARD WHITTLE.

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FROM THE SAME.

SIR,

IN answer to your favour of Sept. 8th, I have only  
to observe, that I continue as usual, to plant only  
the *parings* of potatoes, and the young shoots which  
occasionally spring from the very small ones, generally  
left in the ground as good for nothing, and which  
are seldom picked out, except for the purpose of  
cleaning the land. Sometimes I have planted them  
in drills, and sometimes in holes made with a stick,  
covering them with muck; but as to the manner of  
planting, I have never observed any difference in  
the crops.—Last year, indeed, I was from home a  
considerable part of the year, and I find the potatoes  
were cut in pieces when planted, but I have found  
no advantage by it in the present crop, except what I  
expected from new ground.

When the potatoes are pared for planting, one or  
two eyes should be carefully preserved in every piece,  
and a small portion of the potatoes, about the size of  
an horse-bean to every eye.

I am, sir, your obedient humble servant,

EDWARD WHITTLE.

**ART. VII.***Account of a Series of Experiments, respecting  
SMUT in WHEAT.*

[From JAMES JENNINGS, esq;]

In a Letter to JAMES GORDON, jun. esq.]

SIR,

Harlington, Dec. 21, 1797.

**A**S I understand you are a member of the Bath Agricultural Society, I send you an account of some experiments made by myself, relative to the distemper in wheat called smut, or burnt grain, on the truth and accuracy of which you may depend.

1785. My crop was infected with smut to such a degree, that besides the loss in quantity, the price was not equal to that of my neighbours by 1s. 6d. or 2s. per bushel.

Oct. 1796. I sowed, in two different gardens, found grains picked out of ears, part of which were smutty, the produce was perfectly sound.

I remained much at a loss respecting the cause of this disease, till the year 1789, when I was again called to attend to the subject by the following occurrence:—A neighbour reported to me, that, during his illness the preceding autumn, part of a field had been sown, and he found on his recovery, that the lime used to prepare the seed was old and much slackened with the weather; he therefore im-

mediately sent to the kiln for some quick lime to prepare the seed for the remainder of the field; that which was prepared with slack lime was smutty, the other produced sound corn.

Nov. 6th, 1789. I divided half a pint of perfectly sound wheat into two equal parts:—

1st part, Steeped in strong brine and dried with quick-lime:—*the produce perfectly sound.*

2d, Rubbed with the black powder out of the smut-balls, and steeped and limed as the former:—*half the produce was smut.*

Nov. 3d, 1790. Bought of a neighbour one bushel of very smutty wheat, and divided it into three parts:—

1st, Prepared with brine and lime made into batter:—*produce very smutty.*

2d, Sown dry, without any preparation:—*very smutty.*

3d, Washed in three waters, then floated in brine, and dried with quick lime:—*nearly clean.*

Oct. 7th, 1791. Two pecks of the worst of the produce of the last experiment, were divided into four parts:—

1st, Steeped one hour in strong brine, and sown wet:—*produce very smutty.*

2d, Steeped in water only, and dried with abundance of quick-lime:—*not quite so bad.*

3d, Sown dry, without any preparation:—*very smutty.*

4th, Washed

4th, Washed in five waters, till it appeared perfectly clean, and then sown wet:—*appeared to have but little smut, but when threshed was tailed.*

Oct. 19th, 1792. Divided into four parts two pecks of the worst of the produce of the last experiment:

1st, Sown dry:—*nearly half smut.*

2d, Washed in five waters, and also in strong lye of wood-ashes, and then smothered with quick lime:—*nearly free from smut.*

3d, Steeped in strong brine half an hour:—*above half smut.*

4th, Washed in five waters, and also in strong lye, and sown wet:—*more smut than part 2d.*

Oct. 20th. Of the same wheat, sowed across a land five rows, containing each 330 grains:—

1st row, steeped in strong lye 20 hours:—*had only three ears of smut.*

2d row, sown dry:—*about half smut.*

3d row, steeped 20 hours in strong lime-water:—*only one ear of smut.*

4th row, steeped in strong salt brine 20 hours:—*about two-thirds was smut, and the sound ears were not so good as these of 2d row.*

5th row, washed in five waters, and then in strong lye, perfectly dried with quick lime, kept six days and then sown:—*perfectly sound.*

Oct. 9th, 1793. 1st, Sowed six ounces of old smutty wheat, the produce of experiment 3, 1791, without any preparation:—*produce very smutty,*

smutty, and the plants weaker than those from new seed.

2d, Of the worst of the produce of experiment 3, Oct. 19, 1792, sowed 1lb. steeped 20 hours, in one quart of water, to which was added one ounce of oil of vitriol, and sown wet:—*a few ears of smut.*

3d, 1lb. of ditto, with two ounces of oil of vitriol:—*only two ears of smut.*

4th, 1lb. of ditto, with three ounces of ditto:—*perfectly sound.*

5th, 1lb. steeped 20 hours in strong brine:—*very smutty, nearly half and half.*

N.B. By strong brine, I mean to bear an egg.

6th,  $\frac{1}{2}$  lb. steeped 20 hours in strong lime-water:—*a little smut, enough to tail the sample.*

7th, Part of the same wheat sown dry:—*two thirds were smut.*

I feel myself bound in justice to mention, that I had the first hint of the use of oil of vitriol, in a conversation with Mr. ROBERT D. HICKS, a surgeon at Toddington in Bedfordshire. I have to observe here, that in this, and in all my experiments, the brine seemed always to injure the plants through the whole of their progress, from their being sown 'till harvest; but as it in some degree washed the seed, the produce by this means might be the less smutty. As this experiment seemed to be very satisfactory, with regard to the good effect of oil of vitriol

vitriol as a preventative against smut, I was desirous to ascertain in what proportion it might, with safety, be used; and therefore made the following experiments:—

Aug. 28th, 1794. Chose forty fine grains of new wheat, and divided them into eight parts:—

1st, Steeped 20 hours in oil of vitriol only; 2d,

Steeped 20 hours in oil of vitriol and water in equal quantities:—*did not grow.* In both these cases the wheat was suspended by liquid.

3d, Steeped 20 hours in water with one-fifth oil of vitriol. 4th, 5th, 6th, 7th, and 8th, with the proportion of 1-7th, 1-9th, 1-11th, 1-21, and 1-31 of ditto:—*these all grew well, as did some unprepared.*

But I observed that the plants from the prepared seed appeared to be the most vigorous and handsome; and that the grubs which abounded in the ground, seemed to prefer them.

Oct. 16th. Being convinced, by the foregoing experiment, of the efficacy of the vitriolick acid in preventing smut, I steeped a great part of my seed wheat this year; the bag which was used for that purpose burst on the 10th, and let out about one gallon of the wheat, which remained in the tub till this day, when, on taking it out I found it very soft and much swoln, and I concluded that its vegetative power was destroyed; I, however, sowed it wet, on a small parcel of ground, and raked it in by hand,

and,

and, to my great surprize, in a short time found, from the quantity of plants on the ground, that it must nearly all have grown.

Oct. 21<sup>st</sup>, 1795. Steeped one bushel of wheat 20 hours in oil of vitriol and water, in the proportion of 1 to 30; and by means of a basket, drained the liquid from it, intending to have sown it the next morning, but a very heavy rain falling prevented the seed being sown till the 26th; during which time the seed became nearly dry, and had not sprouted, though some of the same wheat, steeped in water only, and not otherwise under the same circumstances, had grown half an inch or more. The vitriolated seed was sown on half an acre of land at the time above-mentioned, but did not come up till the adjoining lands were all green, and not more than 1-4th of it ever came up at all; and the plants were poor and weak for a length of time.

From the foregoing experiments, it appears,  
 1st, That the disorder is communicated by infection;  
 2d, That the vitriolick acid destroys that infection;  
 3d, That the quantity sufficient is as 1 to 30;  
 4th, That a much greater proportion may be used with safety;  
 5th, That the seed should not be suffered to dry after it is taken out of the steep; but may remain in it some time without danger.

I am, &c. &c.

JAMES GORDON, jun.

[N.B. Some doubt having arisen in the Committee, whether Mr. JENNINGS's proportions of oil of vitriol to water, were estimated by *weight*, or by *measure*, and as on account of the difference in the specifick gravity of those fluids some considerable uncertainty might remain to the practitioner; Mr. SLOPER was desired to procure from Mr. GORDON an explanation of the fact. He therefore wrote to Mr. GORDON on the subject, which produced the following answers.

*Brook's Anti-Smutt Powder received by W. M. Secretary.]*

*To the SECRETARY.*

SIR, *Moore-Place, Jan. 16, 1797.*

IN consequence of a letter I received from Mr. SLOPER, who I requested would do me the favour of looking over the course of experiments that had been made to cure the Smut in Wheat, and which I had communicated to you, I trouble you with this. He sent me several queries, which were necessary to elucidate the process of the experiments. The other side of this contains the answer to them, from my friend Mr. JENNINGS, whose care and accuracy in going through these experiments, and their success, make them highly deserving the publick attention.

I am, sir,

Your most obedient humble servant,

JAMES GORDON, jun.

From Mr. JENNINGS to Mr. GORDON.

DEAR SIR, *at Harlington, Jan. 13, 1798.*

I AM sorry the want of being explicit in the account of my experiments, should occasion you so much trouble; I believe, however, that a second reading of my account will shew that the time necessary for the wheat to remain in the steep is 20 hours. In answer to the other query, please to inform your friends; that I go by *measure*; and that the quantity which I have found succeed, is as one gallon of oil of vitriol to thirty gallons of water. The wheat must not be put into the steep till the heat is nearly gone off.

It may be asked, why I fix upon 20 hours as a proper time for the wheat to remain in the tub; my reason is this: in mine, as in most large farms, there is an odd man employed about home even in seed time; as soon as he has had his breakfast, he puts as much wheat as will be wanted for the next day, into the basket, and lets it down into the tub, where the vitriol and water is; and the next morning, about five o'clock, the basket is pulled up over the tub to drain, that none of the vitriolated water may be lost, and the seed put into the sacks just before we set off; and thus the business of steeping the seed

[ MR. GORDON ]

goes

goes on regularly, without any hurry or hindrance to the labourers employed in the other parts of the business.

I am, truly your's,

J. W. JENNINGS.

**ART. VIII.**

*On Sundry Topics.*

[By Mr. JOHN FELTHAM, *Author of a Tour to the Isle of Man*;

*in a Letter to the Secretary.]*

DEAR SIR,

DETACHED as my pursuits have been from Agriculture, I feel every degree of diffidence, in presuming to offer a few hints on a subject in which individually, I am so little concerned, and, generally, so little informed of. Yet, sir, to a person alive to the best interests of mankind, (subordinately considered) it must be no small pleasure to trace the progress of that society, in which you bear so conspicuous a part—to observe such ample patronage, such satisfactory results, from your united exertions.

Some

Some writer remarks, that whoever makes two ears of corn, or two blades of grass, to grow upon a spot of ground where only one grew before, deserves better of mankind, and does more essential service to his country, than the whole race of politicians put together.

While every considerate mind must deprecate the dereliction of human reason, which associates so large a portion of rational beings, in the study of the instruments of destruction, yours is the gratifying the superior employment of turning the sword into a ploughshare, and the pike into a pruning-knife. It is your's not to exult over slaughtered millions—but to pour the oil of gladness into the bosoms of those less favoured with the comforts of life, making the earth yield more abundantly to their necessities, (the most innocent and laudable of all pursuits) and thereby rendering their condition more consonant with the dignity of human nature.

From what fatality, or from what circumstance it happens, that many of the most useful sciences are, as it were, rejected from publick seminaries of education, while the most frivolous and useless one are adopted, I am at a loss to say; and why we are forbidden to investigate truth, but expected to adhere to a set of established dogmas, may be deplored when, perhaps, the season of improvement is gone by, and society left to pour an unavailing tear over a system of tuition so weak and injurious.

Agricultural tracts (for instance) I have not noticed encouraged in school libraries, or its objects made any part of a tutor's monitions. But, sir, what must be the case, if rational pursuits be not pleasingly enforced on the attention of the young enquirer? Why, if good seed be not sown, tares will usurp its place, and society receive positive injury, in proportion as the mental field is occupied by extraneous and frivolous matter.

One part in those objects which fall within your cognizance, I have noticed with pleasure, and that is, in pointing out (even on a selfish ground) that it is the interest of mankind to treat all animals with kindness and humanity—to give them wholesome food, to work them moderately, and by keeping them warm, clean, and comfortable, shield them from those severities they are (comparatively) as sensible to as ourselves.

Impressed with a conviction of the injuries they sustain from our hands, I have ventured to plead the cause of the Rights of Animals; and in the European Magazine for January 1796, &c. (if I recollect) I published a small compilation on that important subject.

It is difficult for a young writer to advance any thing absolutely new; little is left, but to present well-known facts in a more striking point of view, and thereby rivet attention, and facilitate their reception.

An

An idea has occurred to me, which it was the primary object of this paper to communicate, that might facilitate the progress of agriculture and the arts, and prove lucrative in the adoption, and advantageous to the publick. It is, to establish a manufactory upon an extensive scale, for making very small models of all the instruments used in, or connected with husbandry, upon a neat, portable, and cheap plan; these again to be classed in small chests, comprising varieties of each, &c. with plain descriptions. This would sell patent machines, make publick the most approved methods, be a pleasing introduction into private circles and schools, and by the attention they would excite be highly useful; might form an article of curious exportation, and enable us in return to receive foreign improvements; and open a way to the nearest possible point of perfection. Copper-plates are very inadequate to so good a purpose, as it is conceiv'd might be effected by this mode.

There is another part of agriculture, to which I think attention should strongly be enforced, that is, that hedges could be made sources of much greater profit than at present is attempted. The elder, I conceive, if planted on an extensive scale, would produce most valuable wine, far superior to some foreign; and its underwood be productive and luxuriant enough for domestick purposes. Should we not study to cultivate our bleakest spots, with plants

most

most profitable and useful, as well as congenial? Are there not trees or shrubs that would flourish in such spots, and bear *fruits, whose juices might be turned to many purposes?*

Is not this the case with the berries of the *whitley*, or mountain ash, in the coldest parts of Wales, of which I have read, that its red berries, fermented, afford a grateful acid juice, which is used as common beverage?

Doubtless from northern climates we might learn, what is most useful, under such circumstances as now preclude the adoption of our usual fruits.

I think plain instructions on all topicks of farming, if adopted on the plan of the moral tracts of the Cheap Repository, would be highly beneficial; would sell among all farmers and young persons about them, and thereby exclude those pernicious works that are now intruded on their attentions by indigent itinerants, and operating in the worst way possible on their morals.

I have now to apologize for these few remarks—accept them as a little tribute of regard for your labours, and as from one who will be glad to embrace any future opportunity that may enable him to co-operate with the wishes of the Bath Society.

I am, dear sir,

Your most humble servant,

Bath, 1797.

JOHN FELTHAM.

## ART. IX.

*Description of a DRAINING-PLough.*

WITH A PLATE.

In a Letter to the SECRETARY.

SIR,

Buscot-Park, 1797.

I send for your perusal, and to copy if you please, a letter from my friend, the Rev. MOSES HODGES BARTHOLOMEW, of Edgecot near Banbury, Oxon. You will have the goodness to favour me with your observations thereon, which I particularly request, having received information that in the rooms of the society there is a model of a Draining-Plough, very similar to Mr. WATTS's patent one.

I am, sir,

Your obedient humble servant,

E. L. LOVEDEN.

" DEAR SIR,

Edgecot, Dec. 28, 1797.

" I HAVE sent you a rough draught of a Plough, which I saw worked for the first time in this country, on the 23d instant; my engagements at this season have prevented an earlier communication to you, of a machine so well calculated for your use on your particular land. The whole neighbourhood was quite ignorant of the method of proceeding, except

a neighbour of mine, (who is no mechanick and never held a plough) to whom the machine belonged, and who bought it from the good effects he saw produced by it. A close of old pasture land, containing fourteen acres, was completely underdrained in four hours; from the wetness of the season the furrows were mostly full of water, the ridges were cast rather high, to keep the land dry, which occasioned the growth of rough grass in the furrows, and which rather impeded the work; the plough, from the rolling coulter, was put into a ditch that mounded the ground, (sufficiently low to take off any water) and drawn up the furrows to the highest ground, at the depth of 15 inches: in a few minutes the water ran in a stream through the opening, and has continued so to do, though not in such quantities; the furrows are dry, and so small is the upper appearance, that it seems only like a small mark of a wheel; there was unfortunately a headland, with an open trench nearly filled up; the several underdrains were crossed by one at the same depth; along this trench a stream to the full size of the bore immediately followed, and all the underdrains were emptied by it, except three, which, from the unevenness of the surface, were not crossed. This ground was looked upon as a very dry one, except in wet seasons; is rich pasture land, the soil rather clay, with now and then a thin scaly part. In very wet lands double shafts would be best, and

the

the wheels should always be low; what I saw were too high, and eight or ten horses required; if you do not draw *from* the ditch, you cannot work *into* it; therefore, put the plough into the ditch if possible, or make a short trench to receive the plough when the ditch is on the further side of the hedge, with openings for the water to pass.

“Thinking you would like to be forward in this great agricultural improvement, you are troubled with this letter from an old friend.

“I am, dear sir, your's, &c.”

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*Explanation of the Plate of a Patent Plough for Undraining.*

No.

- 1 Small Roller to prevent the Plough from entering into the ground.
- 2 A Rolling-Coulter to cut the turf and rushes, to be taken out in Arable Land.
- 3 A Flat Share, edged in front.
- 4 Bottom of the Share, round above where united to the flat; oval at the bottom, and pointed to make an opening for the water.
- 5 Pinhead, by which the share may be set to make the drain a certain number of inches from the surface, or less deep.
- 6 Plough-Beam, strong and plated.

This Plough is worked by taking off the fore wheels of a waggon, or other low wheels, with the Shafts to the Axle, and a chain brought from them to the hook A.

## ART. XIII.

*Some further Practical Remarks on the Nature  
of SHEEP and WOOL; and the DISORDERS of  
SHEEP, &c.*

(By Mr. J. COLLINS.)

SIR,

Devizes, Dec. 1791.

WITH a view to improve the wool of a flock of sheep, at shearing time take notice of the fleece when cut off; look at the bottom or part of separation; if it be *stitchy-haired*, mark that sheep for sale, or fattening, whatever other good qualities it may be possessed of. If thin of wool on the back, let that also be marked for sale, or fattening; because, when it rains long or hard, the water penetrates easily to the skin on the back, washes out the yoke, and chills the spinal marrow; the sheep's back in that case is raised into a curve, more or less as the chill is greater or less: and if I may be allowed a conjecture from analogy among the human race, the animal catches cold, a cough ensues, a consumption follows, visible by the leanness and weakness of the animal; and if it be not stopped, or cured, the sheep dies rotten.

In the choice of your fleece for stock, avoid as much as possible a medium between combing and clothing wool; as such would not be so useful for either purpose. Mark the sheep bearing such

wool for sale, or fatting. If your sheep has a very coarse breech, mark it for sale, or fatting. Separate all these, together with scabbed, giddy, fly-blown, foot-root, dog's or pig's mouth, scouring, or any having an infectious disorder, from the flock—and on no account whatsoever suffer them to be with it.

In the first choice of the ram or ewe, never go farther from your own farm, for any ram or ewe, than you can help; if yours be *down* land, buy from off the down; if inclosed, from the inclosed; remember to buy from worse land, if possible, than your own, because there is a greater probability they will thrive in your keeping; but take care not to keep them too well, as that may be attended with great inconveniences, if not with loss; for a sheep should work hard for its maintenance whilst in the flock, yet not be pinched; for then the same or worse inconveniences, or loss, may follow. Choose the handsomest sheep possible, but never neglect the coat or fleece; if that be bad in either of the above-mentioned instances, the sheep, whether ram or ewe, ought to be rejected, to all intents and purposes, however handsome the shape may be. Search the coat of the ram narrowly, to avoid a *stitched-haired* fleece, for this would so damage your wool in two years, that it could not be recovered again, without changing your flock, in 12 or 14 years. Again, however handsome the shape, however fine the wool, reject him if he has not a *close thick* coat (in which is plenty

of yoke, a certain sign of health) along the back. The same care should be used in choosing the ram, whether for combing or clothing wool. Buy your ram a little before shearing-time, if you can; not at any fair or market, but at the farmer's house; for then you will see the ram as he is, without being shorn or trimmed by the *sheep-barber*, purposely for sale; then you will also know the depth, or length, of the staple; the shorter, finer, and thicker it is, the better for clothing-wool; the longer, thicker, and finer, the better for combing-wool. As to the age of the ram, when to be bought, I am not competent to decide. Some I have known to buy lambs at the cutting season; others, two-teeth; others, four-teeth.

As to the ewes, they are rather to be raised out of your own flock, than bought in from elsewhere; as they will be more naturalized to the soil, and other circumstances peculiar to the farm.

In speaking on the disorders of sheep, I do not pretend to treat of them under the notion of a sheep-leech, or doctor, but only by observation and enquiry of the same things, of many different people, as farmers, shepherds, dealers in sheep, and drovers; comparing their accounts together, rejecting fanciful or improbable narration, and retaining such as seemed most agreeable to that analogy which occurred to me in reading, or enquiry, concerning the *human* frame and its diseases, using the hints my informers

furnished

furnished me with, for further and future enquiry, when I was not satisfied.

*Some preliminary observations.*—When a sheep dies, get a surgeon to open or dissect it; get him to make his remarks as he proceeds, you noting them down in a book provided for that purpose: thus do for two or three sheep in every disorder; you will thereby acquire skill enough to examine a dead carcass by yourself. Then, by comparative anatomy, many probable conjectures may be formed as to the disorder, and as to the remedies to be applied, noting down the time, and every other circumstance, together with the following effects. Thus, by little and little, an accumulation will be made of experimental knowledge of the disorders attending sheep, and of a number of useful remedies, either for palliating or curing various disorders.

I know not of any express treatise of the *myology* and *osteology* of a sheep, hog, or ox, but only parts as scattered in various treatises of anatomy; GREW, COLLINS, the French academicians, BLASIUS, VALENTINI, and perhaps others also; but there is a very good one of the horse, by STUBBS, as also by SNARE.

The *rot*, or consumption, is frequently the effect of a cold, to which sheep are very liable who have thin coats, and lodge on wet lands; as appears by their frequent coughing.\* How the *flukes* get into the liver, I can no more account for than how

\* See before.

various

various kinds of worms are bred in the human body, in almost every part. The question *how?* in many cases, is very difficult to be answered, notwithstanding the fact may be certain.

The *pelt-rot*, or falling off of the hair or wool, arises, 1st, From a sudden alteration from a scanty to a full feeding:—2dly, From a *partial fever* in the spot where it falls off, on the neck, shoulders, the back, or the rump:—3dly, The *shab*, loosening it at the ground:—4thly, *Gangreen*, or *sphacelus*, which the falling off of the wool discovers.

The *foot-rot*, or by some called the *gout*, is said by most farmers and shepherds to be infectious. The best information I can get concerning this, is, that between the claws of the fore-feet (as I do not find it attacks the hind-feet) a swelling is perceived, which tends to separate the claws in some degree. On squeezing or lancing it, a *hairy worm* is taken out—the place being anointed with some ointment, and bound up for a few days, the cure is effected.

The *hunger-rot* generally proceeds from the farmer's poverty, or covetousness, in giving very bad hay for their winter provision, which they do not eat; and is very easily discerned by a slight inspection of the flock when in fold.

The *goggles*, a disorder unknown to our ancestors, but, by comparing the different accounts of the effects together, appears very plainly to me, to be a

paralytick

paralytick stroke, affecting the spinal marrow; but whether I am right or wrong in my conjecture, time may discover.

The *red-water*, or the *dropfy*; as the animal swells, the blood almost serum, watery bladders in different parts, chiefly in the fore-part of the animal's body, and the skin when stript off has red spots in various parts, and of various sizes. My conjecture is that the wool, usually called *frothy*, is owing to this disorder; a want of *yoke*, *dryness*, *harshness*, *thin* and *weak staple*, soon becomes dead, little or no proof; on breaking it *cries out*, and much dust flies off. All these symptons are to be found in wool, where the sheep are fed constantly on a very light, sandy, arable soil, as Urchinfield, Herefordshire.

The *stone* is not a common disorder—I have never heard but of one instance of it, viz. a two-toothed ewe belonging to Mr. T. ETHEREDGE, yeoman, Broughton, Hants. It pined away and died—on opening it, in the bladder was found a calculus, the size of a middling marble, loose, round, with short spines, coated externally white as chalk; internally, or rather under the external coat, rather dark. It is in my custody.

The *fly*, or *maggot*; if this happen before shearing, the sheep is indisposed, and does not yield a proper quantity of *yoke*, and thus it becomes a proper nidus for the fly to spit its eggs in, which are soon hatched by the heat of the body. The maggots immediately feed on the flesh of the sheep; but, if

they

they are not destroyed by applying *tar*, or some other known remedy, to the aggrieved place, (a good proverb, not to lose the sheep for a penny-worth of *tar*) they increase so fast in number and size, that the sheep itself is soon destroyed. The attack is usually near the short ribs, after shearing, *if warm moist weather*, which in some measure hinders the yoke from rising, (especially in unhealthy sheep) the flies more particularly attack the sheep, as the stouts or dun-flies do horses, in the like sort of weather.—  
N.B. The wool increases in such sheep, as to its fineness and softness, near and on the place affected, and it has always a yellow-greenish colour.

*Giddiness.* This is said to arise from a worm, or maggot, under the horn, on either side, and that the turning round is the effect of this worm or maggot. I have heard of *cows* being *giddy* also, and that a perforation has been made near the horn, the worm or maggot taken out, and the animal cured.

*Broken-mouthed.* A manifest symptom of age and decay.

*The worm in the tail.* The hair drops off, the animal restless, frequently rubbing the part affected, hindered from eating quietly its food by smart or pain. (Query. Whether if the part were to be opened, the worm taken out, and a plaster applied, the cure might not probably be effected?)

The *shab, scab, or itch*, said to be infectious; I am told there are living insects, whether of the same form

form as in the *human* itch, I do not know; once I saw a scabbed sheep washed with human urine, the consequence whereof was, that in a day or two the scab spread so far as the skin was wetted with the urine. The usual remedy is tobacco, steeped in water (called shab-water) with some oil or spirit of turpentine added thereto, and the aggrieved part washed therewith. N.B. The tobacco often bought for this purpose has very little virtue in it, therefore the water can be but very weakly impregnated with its qualities; on which account, it seems to follow, that tobacco-water has little or nothing to do in the cure; but allowing it to be an useful ingredient towards a cure, it should seem most reasonable to use the strongest tobacco that could be procured, as there must be most virtue therein, whatever that virtue be. But as it is always used with oil or spirit of turpentine, it seems to me probable that the *turpentine* is the specific, properly lowered down with water according as the case may require. I am just now informed by a farmer, that his shepherd gets strong tobacco and flower-sulphur, and boils in the *meat-brine*, and afterwards puts into it some oil or spirit of turpentine; using it without any water, and by applying it in small quantities, finds it effectual. He does not know the proportion of the ingredients; but this may be guessed at, or found by experiments.

*Small and large Tick.*—These abound most with the animal that is diseased, and may therefore be considered

considered as a sign of unhealthiness. [See *Redi de Insectis.*] An abundance even of the small ticks gives the wool a yellowish, greenish colour, the fineness and softness is increased thereby. The *large* tick I have only found in the Sussex and Herefordshire wool; in the latter, I have never found any harm therefrom; but in the Sussex wool and sheep it produces much harm to both. The creature is flat of body, brownish, with some white streaks on its back; six legs; with a flat proboscis, with three notches, like the teeth of a saw, on each side, with this it insinuates to its head into the pelt of the sheep, so that it cannot quit its hold voluntarily; soon after its legs drop off—a scab is raised, out of which oozes from time to time a small quantity of ichorous moisture. The scab spreads as the animal grows—others are generated; and the evil is extended sometimes to the great loss of the farmer. Some farms are more subject to it than others. A few very coarse hairs grow through the scab, considerably coarser than the surrounding wool. The size of a full-grown tick is nearly that of a middling horse-bean. The whole body appears filled with blood, and on opening a dry dead tick, the blood crumbles, and looks very like small grains of gunpowder, brownish, and not shining.

*Dog-worried, bitten, or torn.* This frequently arises from the negligence or impatience of the shepherd; from his dog or dogs not being properly broke in; from the dogs of passengers; from dogs who

who are accustomed to run after sheep, whether they see them; and from the sheep-biting dog, who catches the sheep, usually lambs, by the throat, making a hole, with one of his holders, into the jugular artery or vein, and sucks the blood till the lamb or sheep dies. If the dog be master of his trade, he seldom tears the victim, and hardly leaves a sign when the mischief was done. These things ought to be attended to with care, watchfulness, and diligence.

*The staggers.* This disorder attacks lambs. When ewes and lambs are put into water-meadows in the spring for feeding, it is usual to hurdle off a quantity at a time, according to the number, and the length of time they are to be fed; in the hurdling it off, there is what is called a *gate*, sufficiently open to let the lambs through, and keep the ewes back; the lambs having the milk of the ewes and the first-run of the grass, the largest, stoutest, and best of them frequently die of this disorder, which seems to be of an apoplectick kind, from a too great fulness of blood. If discovered in time, the shepherds frequently bleed them in the eye-vein, and thus a cure is obtained.

*The chill.* is mentioned before. Query. If the sheep which are cotted every night, as in Herefordshire, Monmouthshire, Shropshire, &c, are liable to be hurt by this disorder?

N. B. When such a multitude of sheep died after shearing in June 1795, I found by enquiry they were of the best, stoutest, and healthiest sheep; <sup>the</sup>

the weather was severe, they, to get away from it, got so close together, that they were stifled; whereas the weaker, not being able to thrust in so close, escaped with their lives, as very few indeed of the latter, in comparison to the former, died.

It has been a custom, time immemorial, among the farmers on the South-Downs, after shearing, for a few days, if the weather appear to be inelement, windy, or wet, to house their flocks in their barns, as they are generally empty at that season: and this, or some such precaution, seems to be called for, by experience of the dangerous effects of cold on a newly-shorn sheep.

The *lask*, or *scouring*. Query. If from too-moist food, indigestion, griping, or what other cause? If not stopped, it generally proves mortal.

Some few Remedies used with success.

*Tar*, for a cut in shearing, and to anoint the place where the *flies* have blown.

*Daffy's Elixir* has been given for disorders in the bowels, as well of *sheep* as of horses and oxen; to be worked off with plenty of water-gruel, as that tends to preserve the bowels easy.

A sheet of *writing paper*, boiled in one quart of milk to a pint, the whole to be given to a *cow* at once for the *lask*; at twice to a *sheep*; to be repeated as the case may require.

*Bugloss*. Ointment made from the roots of *bugloss*, when in the fulness of blossom, pounded and boiled

boiled in unwashed butter, then strained into a pot for use. This is exceeding good for bruises, strains, swellings, inside or outside, for man or beast; let it be made strong of the root, well boiled, but not burnt. It is a root scarce to be had, very plenty some years in one place, and in that place none to be had for many years after.

*Preservation of the Health of Sheep.*—Let the farmer frequently look over his flock, and see that their tails are kept clean; for there is no animal which I am acquainted with, but shuns as much as possible its own dung; and therefore it must be very noisome to the sheep, to have such a quantity hanging on to its tail and breech as I have sometimes seen, beside the extremely-disgusting appearance which it gives to a handsome animal. Never suffer them to lodge two nights in the same fold; it is better to fold over twice than to do thus. I am informed, sheep taint where they have been sooner than other animals, perhaps because of their numbers.

The design of my former letter (as well as this) was only to be considered as hints, to be pursued in enquiries which should be made respecting wool amongst the wool-staplers, rather than the farmers, clothiers, gentlemen, or noblemen, (yet not to the exclusion of them in the enquiry) because these would have merely local experience; whereas the wool-stapler frequently buys in several counties, districts, and situations, large and small wools. Again, his

examination goes to all these in general, to every fleece in particular, and to every part of the fleece in special. If he has the knowledge of his business, is a workman therein, and has made pertinent observations as he went on; he must be, in a greater or lesser degree, a man of experience; and consequently the most proper person to be enquired of, as to judgment about wool.

J. COLLINS.

**POSTSCRIPT.**

IT slipt my memory in my last letter, to mention a very common disorder ewes are liable to after yeaning, *a stoppage in the lacteal ducts of the udder*, sometimes in that leading to one of the nipples and sometimes to both: the udder swells universally with partial hard knobs, which soon bring on an inflammation, and if not stopped, perhaps in the course of twenty-four hours part if not the whole of the udder mortifies, and as the mortification proceeds rapidly the sheep dies. The intention is to stop the mortification. The process of cure—is to clip off the wool, as close as possible, to open with a razor or other very sharp instrument, the principal lacteal duct or ducts, to squeeze out the morbid matter, and put in a little fresh

butter; to keep the sheep separate from the flock. The ewe frequently loses the use of one teat, and sometimes both; if but one, she will maintain the lamb; if both, the lamb to be taken from her, and the ewe to be fatted.

On the subject of the disorders of sheep, consult the shepherds rather than the farmers, as they are constantly with the flock; and though many of them are very ignorant persons, nevertheless consult even these, as they may possibly know from tradition some things exceedingly valuable. Note down what they say as particularly as you can, under its proper head. Many things worth knowing may be thus collected together, from facts and experiments. Thus the signs, the symptoms, the progress, the effects of the disorder—the medicines, the quantity, quality, time, manner of application, season of the year—the effects, cure or death. Open the carcase—register what is discovered.

Attend to local observations. On Lockerly Common, Hants, sheep not bred on the common mostly rotted; Broughton Marsh, Hants, (before inclosed) frequently rotted in the summer season. Query. If a strong decoction of hyssop were to be given to those sheep which are bad in a cough, at the beginning, might it not be of great use? As it has been called, time immemorial, “The besom of the stomach.” At least it may be tried with a little trouble, and at a small expence.

To

It would be useful to have drawings or prints of the animals infecting sheep: the fluke, the foot-worm, the giddy-worm, the maggot and the fly produced therefrom; the large tick, the small tick, the shab-insect, the louse; which may be inspected by any gentleman or farmer wishing it.

Great attention should be paid to prevent the tainting of the walk or fold, as it may be the occasion of many disorders, especially in spring when the grass is *naſb*, and the sheep are fed mostly with turnips; they are very subject to scouring at such times.

Turnips hurt the quality of the wool, making the staple thin, weak, and hungry; and, therefore, the damage to the combing-wool is unknown, much of it going to the *pinnels*.—Rape has not been observed to have this effect.

In Sussex, on the South-Downs, those farmers who have been desirous to amend their wool, have made it a constant practice to enquire of the *wool-staplers*, on what farm the best wool was found? And thus concluding the best rams are produced; supposing as they buy many parcels of wool, and see more, they are the best judges, relying on them for such recommendation; and, therefore, it behoves the farmer, whose flock is thus distinguished, to endeavour, to the best of his ability, to support the credit of his flock, his own honour, and that nothing but truth should appear in the disposal of his rams to other farmers. It was thus Mr. ROBERT PALMER, of Chinting-

Farm,

Farm, near Seaford, Sussex, supported his credit and fame for a long series of years.

The proverbs, local observations, speeches, comparisons with ancient laws, to be collected; and at the same time, the people's own interpretation or application of them.

Hint: might not a yearling or two go with the flock when *they* are fed with hay, to eat the leavings? Their dung would be more valuable than those leavings towards the manuring of the land.

Query. Concerning the *yoke* of a sheep, what is its proper quantity? Its use both to the sheep and the wool? Its effects as to a redundancy or deficiency to the sheep and its wool? If ever a total want of it? If the like to be found in any other animal? Whether sheep ever sweat?

There is nothing farther occurs to me as to sheep or wool, as falling within my experience or observation.

I remain, with all due respect, &c.

J. COLLINS.

Mr. Matthews.



## ART. XIV.

*A short account of the long EARTH-WORM, which  
preys on the Roots of Wheat Plants.*

In a Letter to the SECRETARY.

[By FRANCIS FURBER, Bailiff to J. P. ANDERDON, esq.]

SIR,

Henlade, April 24, 1797.

MY master has ordered me to send you a particular account of the worm found at the root, devouring the plants of wheat of many fields in this neighbourhood.

I found this worm first in half an acre of transplanted wheat, about the 24th of March, which made me inclinable to search in another field the 7th of April, where the wheat plants have been going off ever since they first came up, to see if I could find out the worm there. In that field I found scores of plants totally destroyed by this worm, where I found from one to three under each plant; some part of the field was rolled the 3d of March, but the worm was just the same in the rolled wheat as in the other part of the field that was not rolled.

The worm is red, or rather of a yellow cast, and its make is about one inch long, with eleven or twelve joints, a hard shell, white within, six legs before, and one behind, with a black downy or

hairy head, and two little spots on the back, near the tail part. The wheat is attacked by them under the surface of the earth, about the issuing point of the coronal root; and they do not leave the plant till all the nourishment or moisture is drawn from it.

It is the general opinion that the dry weather, and after the wheat seed-time, may occasion the worm; and it is observed here, that the wheat is best where the ground had worked dead at the time of sowing.

I am, very respectfully, sir,

Your most obedient humble servant,

FRANCIS FURBER.

[N.B. The insect above-described is a well-known, tho' in some places an unexpected, enemy to wheat crops, which occasions great destruction. It may be a fruitless hope, that a radical remedy will be found for so secret and formidable an evil. But as it is possible that this insect may be chiefly generated by some particular kinds of manure, or circumstances of soil and season; an ingenuous observation may go, in some degree, to the discovery of the cause; it is much to be desired, that those who may happen to ascertain any new facts on the subject, would be careful to impart them; and above all, to impart the knowledge of any successful means of preventing or lessening the evil. SEC.]

## ART. XV.

*An Account of the principal ENGLISH GRASSES,  
with Descriptions of their respective Excellencies  
and Defects, in regard to Agricultural uses:*

To which are subjoined, a Scheme, exhibiting those relative qualities at one view, and an Alphabetical List.

The whole, with Specimens of each Grass, being a present to this Society, by the ingenious Mr. WILLIAM SOLE, of Bath; and kept in the Society's Library for the inspection of the members.

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No. 1. \* \* \* \* \* \* \* \* \*  
2. \* \* \* \* \* \* \* \* \*

3. **AGROSTIS CANINA.**

*Brown Bent.*

THIS is not a bad sheep-grass, though vastly inferior to sheep's-fescue. It grows on Mendip, and Bagshot and Black heaths, abundantly. It is not a good cow-grass.

4. **AGROSTIS CAPILLARIS.**

*Fine Bent.*

This is the best of the *Bent* tribe, as it makes good hay; its grass, also, being more nourishing than the rest of the *Bents*; but vastly inferior to the *Poas* or *Fescues*.—We have it in all our pastures about Bath.

## 5. AGROSTIS PUMITA.

*Dwarf-Bent.*

Very similar to the foregoing, if not a variety of the same. It grows abundantly on the higher parts of Mendip.

## 6. AGROSTIS STOLONIFERA.

*Creeping-Bent.*

This is the farmer's *couch*, and a great pest to corn-fields. And although all sorts of cattle eat it, it is not a nutritious grass; therefore totally unworthy cultivation.

## 7. AGROSTIS PALUSTRIS.

*Marsh-Bent.*

This grass claims an equal title to be the *Maddington long grass*, as either the *Poa Palustris*, or *Festuca Fluitans*; for I find it growing in equal proportion on the same mead with either of the above. It is a good grass for wet meadows and pastures, where better would not thrive. We have it in Newton-mead abundantly.—Refer to No. 61, 96, and 97.

## 8. AGROSTIS ALBA.

*White-Bent.*

This is a soft waxy grass, affording but little nourishment. It is common in wet, sandy places; e.g. Pits on Hounslow-Heath, and in some parts of Glastonbury Moor.

## 9. AGROSTIS

9. **AGROSTIS MINIMA.**

Mentioned by STILLINGFLEET in Wales, but not found at present.

10. **AIRA CHRISTATA.***Crested Hair-Grass.*

This is a middling grass, its hairiness betokens its coarseness; but its being seldom found in blossom, even where it abounds, denotes also that it is not relished. I observed on Gog-Magog Hills, in the year 1775, a piece of ground detached for mowing, in which this grass was predominant, and in full bloom; but I could find none of it without the hedge. I therefore conclude it to be a passable grass for sheep and deer. We have it on Claverton-Down.

11. **AIRA CERULEA.***Blue Hair-Grass.*

This is a *fen grass*, of some account in the Isle of Ely, where they make besoms of it, called *bent-besoms*; but no ways fit for cultivation, it being so hard and sour that nothing eats it. We have it on Glastonbury Moor abundantly. It grows to six feet in height.

12. **AIRA AQUATICA.***Water Hair-Grass.*

This is a very sweet grass, abounding with sugar, and is excellent for butter and cheese; but cannot be cultivated, as it must have water to grow in. We have

have it in ponds and water-grips about Hampton, and the ditches in Glastonbury Moor, abundantly.

This grass contributes greatly to the sweetnes of Cottenham cheese, and to the finenes of Cambridge butter.

13. **AIRA CÆSPITOSA.**

*Turfy Hair-Grass.*

This is a stately, elegant grass; but so rough and harsh that nothing eats it. We have it abundantly in all our woods. It grows from five to six feet high.

14. **AIRA FLEXUOSA.**

*Purple Hair-Grass.*

This grass has pretensions to merit for sweet mutton, it being a principal grass on Banstead-Down, Mendip, &c. and is equally fine and nutritive with sheep's-fescue; but yields to that in not being so productive, and in being difficult to cultivate. Shepton, Beacon, and Mendip, are the nearest places to Bath where I have found it.

15. **AIRA MONTANA.**

*Mountain Hair-Grass.*

A good venison and mutton grass; but, like the foregoing, impatient of cultivation. Found on heaths at Maiden-Bradley.

16. **AIRA CANESCENS.**

*Grey Hair-Grass.*

This is an excellent sheep-grass, and but little inferior to sheep's-fescue; but as it affects sand and

sea air, it is difficult to raise. It is the predominant grass of Maiden-Down, and all the downs between Exeter and Bridport. It would be worth trying on poor land.

17. **AIRA PRECOX.**

*Early Hair-Grass.*

This dwarf grass comes up and ripens in ten weeks, it is not fit for cultivation.—St. Vincent's Rocks.

18. **AIRA CARYOPHYLLEA.**

*Silver Hair-Grass.*

A pretty grass to look at, but an unprofitable one; affording but few radical leaves, and being but a ten-weeks plant.—Maiden-Down.

Mr. STILLINGFLEET thinks better of it than I do.

19. **ALOPECURUS PRATENSIS.**

*Meadow Fox-Tail Grass.*

This is an excellent grass, either for pasture or hay, and is very productive. We have it in our best pastures, about Laycock-Abbey abundantly; and it is one of the first dairy-grasses.

20. **ALOPECURUS AGRESTIS.**

*Fox-Tail of the Corn-Fields.*

A sweet grass; but being an annual, is not an object for cultivation. In corn-fields.—Hampton, Bathwick, &c.

21. **ALOPE-**

## 21. ALOPECURUS GENICULATUS.

*Floating Fox-Tail Grass.*

This grass is too small for cultivation, especially as it loves water; but it is a most excellent sheep-grass, where it takes to grow spontaneously. Witness the fine extensive common between the New and Old Passages at Aust, and on which this is the predominant grass. All passengers, who look about them, must be astonished at the quantity of stock which that common supports; and more so, when they observe this poor, neglected little grass to be the hero of the place.—We have but little of this grass about Bath. I have seen it in a pond near Wraxall.

## 22. ALOPECURUS BULBOSUS.

*Bulbous Fox-Tail Grass.*

This is a very sweet grass, and refused by nothing that eats grass. Found in sandy pastures about Burnham and Barrow.

## 23. ALOPECURUS MONSPELIENSIS.

*Sand Fox-Tail.*

An annual, not worth cultivating. Found on sands in Essex.

## 24. ALOPECURUS VENTRICOSUS.

*Panic Fox-Tail Grass.*

A very rare grass, but not a very valuable one, being an annual. Found in a sandy corn-field near Wraxall-Ponds.

## 25. ANTHO-

## 25. ANTHOXANTHUM ODORATUM.

Sweet Spring-Grass.

This grass, like the rough *Cock's-Foot*, is always to be found in flower in pastures that are well stocked, which leads me to conclude, it is not over-relished by cattle in general; and therefore not deserving the great character which some authors have given of it, merely on account of its fragrance; which, perhaps, is the very reason why brutes reject it; since we see that sweet-meats pall our appetites, instead of affording nourishment.

It also affects poor, sandy grounds; and is found very sparingly in our rich pastures about Laycock, Melksham, and Chippenham; but abundantly on the sandy soil of Spy-Park, Wraxall, and our poor land under the Sham-Castle, and the two Starve-Alls. Yet it might do very well sown in the ratio of one-eighth. For though we cannot dine on sugar, yet it has its use.

## 26. ARUNDO PHRAGMITES.

Common Reed.

Its economical use is for thatching, for which purpose it is superior to any thing growing in England, being neater and more durable than any other thatching. And since the improvement of the fens, by draining, it is become so scarce as to render those pieces of water, which produce it, of almost equal value to the drained grounds, as it bears at this time

a con-

a considerable price. We have it sparingly in some places by the sides of our Avon.

27. **ARUNDO CALAMAGROSTIS.**

*Hedge-Reed.*

A stately grass, and an ornament to the banks and hedges; but that is all, being rejected by all sorts of cattle. Grows in the hedges between Hinton Abbey and the church.

28. **ARUNDO EPIGEIOS.**

*Small-Reed.*

This grass is peculiar to the fens about Ely; nothing eats it; it is called, by the fen-men, *Maid-Hair*. Haflocks of it dug up are converted into pesses for churches, &c.

29. **ARUNDO ARENARIA.**

*Sea-Reed.*

This grass is of great service in keeping up the sand-banks against the sea-side. There are also very good besoms made of it at Axbridge. They call them sedge-besoms. It grows in vast abundance, for eight miles together, about Burnham and Barrow, in Somersetshire.

30. **AVENA NUDA.**

*Naked Oats, or Pillars.*

This is reckoned amongst the indigenous plants of England, but I have never found it wild; it is cultivated

tivated in Cornwall at the Land's-end, and makes exceeding fine oat-cakes. It has also the good quality of thriving on the poorest land.

31. **AVENA FATUA.**

*Wild-Oats.*

A great pest to corn-fields.

32. **AVENA PRATENSIS.**

*Meadow Oat-Grass.*

This is a tolerable good pasture-grass, especially for poor, brashy, and stony land; as it will thrive where the *Poas*, its betters, will not. It grows abundantly about Farley quarries, and high banks on the edges of King's-Down, Chapel-Plaister, &c.

33. **AVENA PUBESCENS.**

*Hairy Oat-Grass.*

Not worth cultivating, being too rough to be pleasant. Grows in stony, brashy land, as in pastures about Badminton.

34. **AVENA FLAVA.**

*Yellow Oat-Grass.*

This is a tolerable sweet grass, though vastly inferior to the *Poas* and *Fescues*. It is common in dry pastures, as the Common-House closes, Bath.

35. **AVENA**

## 35. AVENA ELATIOR.

*Tall Oat-Grass.*

This grass is very luxuriant in its growth; it is rather coarse, but makes tolerable good hay. It is common in all meadows.

## 36. BRIZA MEDIA.

*Common Quaking-Grass.*

Kine like this grass very well, nor does it make bad hay; and as it will thrive on poor, wet, and cold land, ought not totally to be rejected. It grows on the wet grounds about Wraxall abundantly.

## 37. BRIZA MINOR.

*Least Quaking-Grass.*

An annual, unworthy of cultivation. Found in the island of Jersey.

## 38. BROMUS SECALINUS.

*Brome-Grass, whose seed resembles Rye.*

This is a great pest to our corn-fields, and not inaptly called by our farmers *Lob-Grass*, from its tall lobbing heads overlooking the corn.—It grows also too much in meadows; it affords bad grass, and worse hay.

## 39. BROMUS SQUARROSUS.

*Strutting Brome-Grass.*

A very unprofitable grass, and is often called by the country people *Wild-Oats*.

## 40. BROMUS

40. **BROMUS ERECTUS.***Upright Brome-Grass.*

Grows in stony, brashy places; *e.g.* road-side opposite the Shire-Stones, going to Colerne.

41. **BROMUS ARVENSIS.***Corn Brome-Grass.*

Found in corn-fields about Glastonbury and Shepton.

42. **BROMUS MURALIS.***Wall Brome-Grass.*

On the Borough-Walls, at Exeter; also under the rocks at the Hotwells, by the river-side. We have no loss in not having this grass in our county.

43. **BROMUS STERILIS.***Barren-Brome; or, the Brome of barren places.*

Grows in stony, brashy places, under hedges; *e.g.* under the garden-hedges by the river-side going to Twerton.

44. **BROMUS GIGANTEUS.***Tall Brome-Grass.*

The whole tribe of bromes are unprofitable to the farmer; no beast eating them. Height from seven to eight feet. Grows in woods and hedges; *e.g.* Smoakum-wood.

45. **BROMUS NEMORALIS.***Wood Brome-Grass.*

Grows in King's-Down wood.

46. **BROMUS**

46. **BROMUS HIRSUTUS.***Rough Brome-Grass.*

Grows in woods and hedges; e.g. Welton-wood, and woods at Hinton-Abbey.

47. **CYNOSURUS CRISTATUS.***Crested Dog's-Tail Grass.*

This is a very fine grass both for pasture and hay; but particularly fit for parks and sheep-walks. We have it in all our upland pastures.

48. **CYNOSURUS ECHINATUS.***Rough Dog's-Tail Grass.*

An annual grass, and of course not worth cultivating. Essex.

49. **CYNOSURUS CÆRULEUS.***Blue Dog's-Tail Grass.*

I take this not to be a very good grass, as I observed many haifocks of it in bloom in pastures, that were stocked, in Craven. Grows near the ebbing and flowing well at Giggleswick, abundantly.

50. **DACTYLIS CYNOSUROIDES.**51. **DACTYLIS GLOMERATUS.***Rough Cock's-Foot Grass.*

A very coarse ordinary grass, refused by all cattle. Too common in all pastures.

52. **ELYMUS**

52. **ELYMUS ARENARIUS.**  
*Sea Lyme-Grass.*

This grass, together with the sea-reed, helps to support the sand-banks from the encroachments of the tide. Grows near St. Ives, Cornwall.

53. **FESTUCA OVINA.**

*Sheep's-Fescue Grass.*

So justly celebrated for the mutton and venison that it feeds. This is the predominant grass of all our downs; and is, perhaps, the best grass for bowling-greens, lawns, &c.

**FESTUCA OVINA TENUIS.**

*The finest Sheep's-Fescue.*

It grows on Banstead-Downs and Gog-Magog Hills.—We may credit the Londoners for the sweetnes and superior excellence of Banstead mutton, from a comparative view of its *festuca ovina*.

54. **FESTUCA VIVIPARA.**

*Viviparous Fescue.*

Bearing young grasses instead of seed.—*Vide* Pennant's *Journey to Snowdon*, pages 160 and 161. Snowdon-Hill.

55. **FESTUCA DURIUSCULA.**

*Hardish Fescue-Grass.*

This is an excellent grass, and worthy of all cultivation. Its verdure is most delightful to the eye, it affords

affords rich pasture, and makes the finest hay, it grows from three to four feet in height. It is common in all our meadows about Bath.

56. **FESTUCA DURIUSCULA FILIFORMIS.**

*Fine-leaved hard Fescue.*

It grows in dry upland pastures, where it becomes almost as fine as *Ovina*. Meadows, Beachen-Clift.

**FESTUCA DURIUSCULA MARITIMA.**

*A third variety of hard Fescue.*

It grows in salt marshes—at Highbridge, &c. Its leaves, when fresh, are a true sea-green.

57. **FESTUCA RUBRA.**

*Reddish Fescue-Grass.*

This is a middle grass between *Ovina* and *Duriuscula*, approaching nearest to *Duriuscula* in its leaves, and partakes of the virtues of both; and is, perhaps, equal to either.

58. **FESTUCA CAMBRICA.**

*Welsh Fescue-Grass.*

A tolerable sweet grass, but far inferior to *Ovina* and *Duriuscula*. On the mountains of North-Wales.

59. **FESTUCA BROMOIDES.**

*Brome-like Fescue.*

A mean ten-weeks grass, below the farmer's notice. Grows on St. Vincent's-Rocks.

60. **FESTUCA**

60. **FESTUCA MYURUS.***Capon's-Tail Grass.*

An annual, unworthy the farmer's notice; yet has beauty enough to command respect from others.— Grows on all the high walls about London, and thatched cottages, &c. in Essex.

61. **FESTUCA FLUITANS.***Flote Fescue-Grass.*

This is a most excellent grass, and what cattle are so fond of, as often to endanger their lives in getting at it; as it always chooses water with a miry bottom to grow in, therefore cannot be cultivated. It is to this grass we are indebted for our fine Cottenham cheese; the land all round Cottenham, in Cambridgeshire, abounding with this grass. Mere and Cheddar cheeses, also, owe their fame, in great measure, to this grass. This is the Maddington long grass of Mr. STILLINGFLEET. It grows plentifully in the moors under Cheddar, Glaston, Mere, &c. we have it in ditches and ponds about Bathwick and Lyncombe, &c.—See No. 7, 96, and 97.

62. **FESTUCA LOLIACEA.***Spiked Fescue-Grass.*

This is a harsh, dry grass, unworthy of cultivation. It grows abundantly at Weymouth, in the hedges and borders of the closes, on this side the town, to the right of the turnpike-gate.

## 63. FESTUCA PRATENSIS.

*Meadow Fescue-Grass.*

This is a very excellent grass for cultivation, and yields to none, but *Poa Pratensis*, for merit; being sweet, luxuriant, and very quick in its growth; affording rich pasture, and making good hay. It abounds in the rich meadows about Melksham, Laycock, and Chippenham. We have it sparingly in Bathwick meadows.

## 64. FESTUCA ELATIOR.

*Tall Fescue-Grass.*

This is a very luxuriant and productive grass, but coarsish; cows are fond of it, but not horses. It grows in the moist, shady borders of our best pastures; e. g. Inyx, Bathwick. It grows from five to six feet high.—There is a moist, shady bank, a quarter of a mile out of Sherborne, in the way to Dorchester, where I have seen it at the prodigious height of eight feet.

## 65. FESTUCA DECUMBENS.

*Heath Fescue-Grass.*

A harsh, unpleasant grass, totally unworthy of cultivation. It grows on swampy heaths; e. g. the wet parts of Maiden-Down.

## 66. FESTUCA PINNATA.

*Spiked Wood Fescue-Grass.*

More a kin to the Bromes than the Fescues, and like all that tribe unfit for use. Colerne-Park wood.

67. **FESTUCA SYLVATICA.***Wood-Fescue.*

This mule is made a Fescue by some, and a Brome by others. The blood of the Bomes is predominant in it, for it has all their bad qualities, without the least good one of the Fescues.

68. **HOLCUS LANATUS.***Meadow Soft-Grass.*

This is a very productive grass; but from its woolliness and softness, not excellent either for pasture or hay. It is common in all moist meadows.

69. **HOLCUS MOLLIS.***Couchy Soft-Grass.*

We are lucky in having neither Darnell, Wall-Barley, nor this species of couch about Bath. It is very common at Hampstead and Highgate, where it infects the gardens and corn-fields with its quickening roots.

I am sorry to find, since writing the above, that Wall-Barley has found its way hither, and established itself in Brett's timber-yard, Bath; it is to be feared he will flourish too well in the vicinity.

70. **HORDEUM MURINUM.***Wall Barley-Grass.*

All the English Hordeums are not only useless, but absolutely noxious; children having sometimes

been choaked by putting them, particularly this sort, into their mouths. No beasts eat it. This grass, though common in most places, is not so about Bath. Found on Glastonbury-Tor hill.

N.B. But is since arrived here.

71. **HORDEUM PRATENSE.**

*Meadow Barley-Grass.*

A sweet grass for pasture, but unfit for hay on account of its awns.—Bathwick meadows.

72. **HORDEUM MARINUM.**

*Sea Barley-Grass.*

It is called Squirrel-grass on the Kentish coast, and is very hurtful to horses' mouths. Grows on the sea-banks about Burnham and Barrow.

73. **HORDEUM SYLVATICUM.**

*Wood Barley-Grass.*

This is a *secale* of Ray and Morrison, and called by them *Wood Ray-Grass*; it is a four, unprofitable grass.—Stoken-Church Woods.

74. **LOLIUM PERENNE.**

*Ray-Grass.*

This is an excellent grass, both for pasture and hay, all sorts of cattle being fond of it; clean hay of this grass is particularly preferable for race-horses and hunters, as it does not affect their wind, and blow them, as other hay does; and notwithstanding it runs all to bents, yet the juice is so concentrated in

them, as to afford greater nourishment to a horse than twice its quantity of common hay.

The celebrated RAY, and after him Sir JOHN HILL, both say of this grass, “Locis nonnullis pro jumentorum pabulo seritur, et *Ray-Grass*, dicitur; “est enim pingue, et ponderosum adeoque jumentis “saginandis aptissimum.”—*Hill, Flor. Britan.*

It suits most of the stony corn-fields about Bath. Mr. CROOME had a fine crop of it last summer, well got in; and his horsekeeper informs me, that the horses are so very fond of it as to reject the clean corn for it.

#### 75. *LOLIUM PERENNE PANICULATUM.*

A variety of *Ray-Grass*, as it grows upon dry hills; e. g. Little-Salisbury Hill, Batheaston, &c.

#### 76. *LOLIUM TEMALENTUM.*

*Darnel-Grass.*

A great pest to corn-fields in general; but is luckily a scarce grass in this part of Somersetshire. Our farmers call the seeds of it *cheats*.

It is of an intoxicating quality, and there are many instances, both on record and traditionary, of people being intoxicated with bread which has contained it,

#### 77. *LOLIUM BROMOIDES.*

*Brome-like Ray-Grass.*

A fine grass for pasture, where it grows spontaneously. Witness the rich salt-marshes below Huntspill,

spill, where it constitutes one of the principal grasses. The fine black oxen feeding here are hardly to be paralleled.

78. **MELICA NUTANS.**

*Wood Honey-Grass.*

This grass has beauty, and that only, to recommend it, unless to linnets, which are fond of the seed, which ripens in good time for them, being a very early grass. Found in woods at Prior-Park, &c.

79. **MELICA MONTANA.**

*Mountain Honey-Grass.*

Not fit for cultivation. This, like the foregoing, is excellent food for granivorous birds. I found this in a mountainous wood near Matlock, Derbyshire.

80. **MILLIUM EFFUSUM.**

*Wild Millet-Grass.*

Although this grass has no qualification to recommend itself to the farmer, (since it will thrive nowhere but in deep shady woods) yet its beauty and odour cannot fail to strike the speculative walker with admiration and delight. When green, it has a delicate scent of new hay, and not so grossly powerful as the *Vernal Sweet Grass*. It grows from five to six feet high; linnets are fond of the seed.—Grows in Smallcomb wood and Hinton wood.

81. **NARDUS**

81. **NARDUS STRICTA.***Heath Mat-Grass.*

An unprofitable grass, growing on heaths, refused by everything. Grows on Bladon and Maiden downs.

82. **PANICUM VIRIDE.***Green Panic-Grass.*

None of the English Panics are worth cultivating, unless for birds; the hard-billed tribe of which are fond of the seeds. It grows in Surry.

83. **PANICUM VERTICILLATUM.**84. **PANICUM CRUS GALLI.***Loose Panic-Grass.*

Grows about London.

85. **PANICUM SANGUINALE.***Cock's-Foot Panic-Grass.*

The Panics are all good bird-seeds. Grows about London.

86. **PANICUM DACTYLON.**87. **PHALARIS CANARIENSIS.***Manured Canary-Grass.*

Sown frequently for birds' seed.

88. **PHALARIS ARENARIA.***Sea Canary-Grass.*

This is an insignificant grass of ten-weeks duration only. It grows on sandy beaches, and affords plenty of seed for Finches; e. g. Portland-Island.

89. **PHALARIS**

89. **PHALARIS ARUNDINACEA.***Reed Canary-Grass.*

This is an ornament to river-sides, but not useful. We have it by the sides of the Avon abundantly.

The lady's-lace, so frequent in gardens, is a variety of this grass.

90. **PHLEUM PRATENSE.***Meadow Cat's-Tail Grass.*

I am informed, this is what is meant by *Timothy grass*. Be that as it may, it is a very coarse, ordinary grass, and not worth cultivating in England; where many, vastly its superior, will grow equally well. It is common in all our meadows.

91. **PHLEUM NODOSUM.***Knotty Cat's-Tail Grass.*

This is a fine exuberant grass, very fit for dairy pastures, and for cow hay, as it affords a vast quantity of rich milk, and kine are fond of it. Horses and sheep reject it, where Poas and Fescues abound, but not else. It grows in all the dry, hilly pastures about Bath.

92. **PHLEUM PANICULATUM.***Branched Cat's-Tail Grass.*

Not worth cultivation, being a ten-weeks grass.

93. **POA AQUATICA.***Reed Meadow-Grass.*

This excellent grass, in its native soil, the fens of the Isle of Ely, grows to the height of six feet. It is

usually cut when about four feet high; when dry, they bind it in sheaves; it generally undergoes a heat in the rick, which improves it. It is excellent fodder for milch-cows—horses are not fond of it. The inhabitants there call it *fodder*, by way of eminence; other kinds of coarse hay being called *stover*, i. e. *coarse stuff*; it is also called *white-leed*, drying of a white colour. We have it by our river-side in Kingsmead, here and there a small patch.

94. **POA PRATENSIS.**

*Great Meadow-Grass.*

This is the most noble of all the grasses, agriculturally considered. Every thing that eats grass is fond of it, it makes the very best hay, and affords the richest pasture. All our best meadows abound with it, particularly about Laycock and Chippenham. It moreover has this good qualification, of abiding in the same ground everlastingly; whereas most other grasses are for ever changing places.

95. **POA TRIVIALIS.**

*Common Meadow-Grass.*

This is a fine grass, both for pasture and hay, yet very inferior to the *Poa Pratensis*, being apt to go off after mowing, and suffer itself to be supplanted by *Agrostis Repens*, a much inferior grass still; but manure and feeding keep this grass in vigour, and prevent the piratical depredations of *Agrostis*. All the

the *Agrostes* are plunderers, and thrive only when their wealthy neighbours go to wreck. Its radical leaves, as those on the stalk, grow much longer than those of *Pratensis*. Its usual height two feet.

96. **POA PALUSTRIS.**

*Marsh Meadow-Grass.*

This is a fine exuberant grass, and perhaps the very best dairy-grass we have. It grows in rich marshes all over the kingdom, especially such as are often refreshed by rivers overflowing occasionally. It must be a most excellent grass for laying down spongy grounds, &c. Its height is generally four feet, and often five; it grows by our river-side. Its panick, when fully blown, is wonderfully fine and flowing.

97. **POA PRÆLONGA.**

*The Long Grass of Maddington, on  
Salisbury Plain.*

This most excellent grass, whose fame is spread all over England, needs no eulogium here. But as it is differently described by different authors, who all name different grasses, I shall give my opinion of it.

Farmer JOHN HOOPER, who now occupies the ground, accompanied me to the field, and gathered those specimens here inserted, which are nothing more or less than *trivialis*; and I am convinced, it is the ground itself, and not the kind of grass, which constitutes the vast product talked of. The

soil

soil itself resembles, as deep as I could penetrate with a long knife, (viz. eight inches) an old mushroom bed; and the noted grass, so much talked of, consists of four sorts; and is not a peculiar grass, as generally supposed.

The four predominant grasses, above alluded to, are as follow:—First, of this, which is the principal; and 2dly, of *Flote-Fescue*; 3dly, *Common Couch*, whose root thrives prodigiously in this loose rich soil, and which, perhaps, is the cause of its fattening hogs, which no other field has the property of doing; and 4thly, of *Agrostis Palustris*.—These four different grasses blow in four different months, which I take to be the reason of every author describing a different grass, for he who goes in May finds this *Poa* in bloom; he in June, *Flote-Fescue*; he in July, *Couch-Grass*; he who goes at Michaelmas finds *Agrostis Palustris*.

This ground being overrun by streams of water from the street, farm-yards, &c. upon every down-fall of rain, it is rendered so prolific as to bear four crops a year; and by the course of the water the grass is kept couchant, and in that spongy soil strikes at the joints, so that it will creep a vast length some wet years. This last May (1789) being very dry, it did not begin to creep before my visit; these being the best specimens Mr. HOOPER and I could find; but eight years ago I procured specimens, six and eight feet in length, of *Poa Trivialis*.

Mr.

Mr. RAY has described the 3d,  
*Gramen Caninum longissimum* for the  
 Mr. STILLINGFLEET the 2d, } Long Grass.  
*Festuca Fluitans longissima* - - -

98. *POA ANGUSTIFOLIA.*  
*Narrow-leaved Meadow-Grass.*

This is a very sweet grass, particularly for hay; but, like the *Trivialis*, is apt to go off after mowing. We have it, sparingly, in the meadows about Hinton-Abbey; it also grows on the Borough-walls, Saw-Close, Bath.

99. *POA BULBOSEA.*  
*Bulbous Meadow-Grass.*

This grass has all the good quality of the *Poa Pratensis*, so far as its size will allow; and very proper for hilly dry grounds, and poor land, which it likes to grow in. We have it about the dry hilly pastures, about Newton-St.-Loe.—See *Vaillant's Paris. tab. xvii. fig. 8.*

*POA SETACEA.*  
*Fine Meadow-Grass.*

A very fine rich grass for upland pastures, loving a dry soil. We have it in the hilly pastures about Newton in abundance.

This, like *Poa Pratensis*, is an everlasting grass; of which I think it a variety, as its root evinces. Mr. HUDSON makes it a variety of *trivialis*.

100. *POA COMPRESSA.**Compressed Meadow-Grass.*

This is an excellent grass for parks and sheep-walks, deer and sheep being fond of it; and as it is a dwarf grass, the blades seldom exceeding two inches, it makes a fine turf, and renders the flesh of the animal short and sweet-flavoured. It is found in blossom in the two Starve-Alls, on each side the one-mile-stone going to Claverton-Down; and no doubt but abundantly on the down itself, but the sheep never suffer a bent of it to blow there.

101. *POA (alba) ANNUA.**White Meadow-Grass; or, Suffolk Grass.*

This is the quickest grower of all the grasses, for it will come up, bloom, and ripen its seed in one month; it is called *Annual-Grass*, it ought to be called *Mensual*; and as it will keep time with no other grass, it is not worth sowing. Besides, it is always leaving the ground bare in patches, (unless an *Agrostis* happens to be at hand to fill its place with couch) yet, to do it justice, it is a very sweet grass, and generally liked. It grows by way-sides every where.

102. *POA MARITIMA.**Sea Meadow-Grass.*

This is a fine nourishing grass, and one of the principal of our best salt-marshes, as Aust, Highbridge, &c.; but as it loves salt, it is impatient of cultivation.

103. *POA*

103. **POA RIGIDA.***Hard Meadow-Grass.*

An annual, and unworthy of cultivation, being for the most part destitute of radical leaves. It grows in barren and stony places; such as the two Starve-  
Ails, on each side the first mile-stone to Claverton. Asses like it.

104. **POA LOLIACEA.***Sea Hard Meadow-Grass.*

The most insignificant of all the *Poas*; yet it has one good quality, that of growing where no other grass will, viz. in the driest, parching sea-sands.—Near the lime-kiln under Portland-Island.

**POA DISTANS.***Fen Meadow-Grass.*

An exceeding sweet grass, affording very rich milk; but hard to cultivate, as it delights in mire. It grows in most sea-marshes, and abundantly in Cottenham streets, closes, and fens, Cambridgeshire.

Mr. HUDSON has, in his last edition, made it a variety of *Aira Aquatica*; it appears to me to be totally different.—See No. 12 of this collection.

105. **STIPA PANATA.***Feather-Grass.*

Of no economical use; but the beautiful long feather, which is attached to each seed, is worthy of admiration. In cliffs of high rocks.—Northumber-  
land.

land. The feather not only serves to waft it from rock to rock, but, by the agitation of the wind, to insinuate it into any cliff or crack, where it pitches; for it will not readily strike root in the ground.

106. **TRITICUM REPENS.**

*Couch-Grass; or, Dog's-Grass.*

A great pest to all gardens. Hogs are fond of the roots.

107. **TRITICUM CANINUM.**

*Bearded Dog's-Grass.*

Useless. Common in all the woods about Bath.

108. **TRITICUM JUNCEUM.**

*Sea Couch-Grass.*

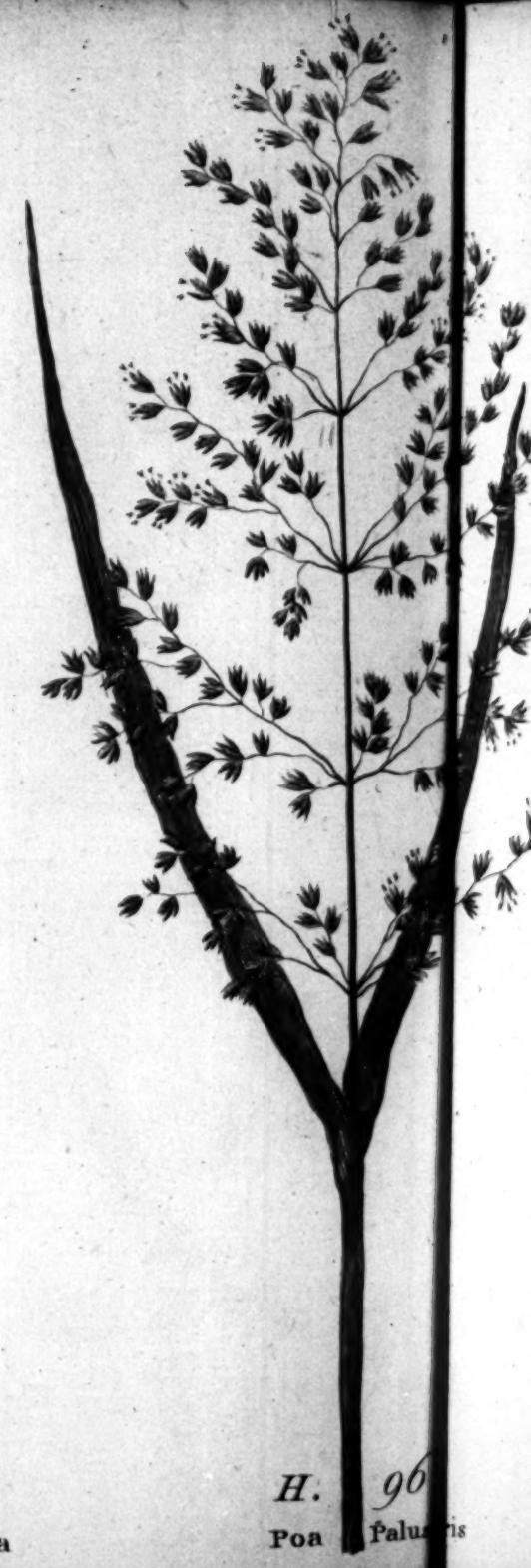
Totally unfit for cultivation. Grows on the sands at Burnham and Barrow, Somerset.

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	δ	Stolonifera	-	-	-	-	6.
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P.		Alba	-	-	-	-	8.
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	2.	Cœrulea	-	-	-	-	11.
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	4.	Cæspitola	-	-	-	-	13.
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	8.	Prœcox	-	-	-	-	17.
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	3.α	Epigeios	-	-	-	-	28.

Ufus.	Hud.		No.
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6.		<i>Giganteus</i>	44.
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		<i>Hirsutus S.</i>	46.
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	8.	<b>Elatior</b>	-	-	-	-	64.
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	10.	<b>Pinnata</b>	-	-	-	-	66.
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	2.	<b>Mollis</b>	-	-	-	-	69.
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	1.	<b>Nardus Stricta</b>	-	-	-	-	81.
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	2.	<b>Verticillatum</b>	-	-	-	-	83.
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	2.	<b>Arenaria</b>	-	-	-	-	88.
	3.	<b>Arundinacea</b>	-	-	-	-	89.
<b>Z.</b>	1.	<b>Phleum Pratense</b>	-	-	-	-	90.
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<b>M.</b>	1.	<b>Poa Aquatica</b>	-	-	-	-	93.
<b>A.</b>	2.	<b>Pratensis</b>	-	-	-	-	94.





Uſus.	Hud.														No.
G.	3.	Poa Trivialis	-	-	-	-	-	-	-	-	-	-	-	-	95.
H.	$\beta$	Palustris	-	-	-	-	-	-	-	-	-	-	-	-	96.
H.		Prælonga S.	-	-	-	-	-	-	-	-	-	-	-	-	97.
I.	4.	Angustifolia	-	-	-	-	-	-	-	-	-	-	-	-	98.
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	1.	Triticum Repens	-	-	-	-	-	-	-	-	-	-	-	-	106.
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	3.	Junceum	-	-	-	-	-	-	-	-	-	-	-	-	108.

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*Explanation of the above Scheme.*

*Uſus.*—The column, denominated *uſus*, shews what grasses are useful in agriculture; and the rank of honour which each grass is entitled to, is denoted by *Italick* capitals, in alphabetical gradation. For instance, if it be required to know in a minute which is the nobleſt of all the grasses, look for *A.* *Poa Pratensis*. For the worst of those fit for cultivation, see *Z.* *Phleum Pratense*; and so of the rest. Those marked with *Roman* capitals, denote such grasses as hold an equal rank in goodness with their correspondent *italick* capitals; but are unfit for cultivation on any ground, but what is frequently under water, being *fen-grasses*. And those which have *no* capitals prefixed to them, are to be understood as *trivial* or *useleſs*.

*Hud.*—The column, denominated *Hud.* denotes what grafts it is of Mr. *HUDSON*, in his admirable work, the *Flora Anglica*, ad edition. For instance, *3.* *Agrostis Capillaris*, means, that it is the third *Agrostis* of his Flora. And *γ* *Agrostis Pumila*, that it is the third variety of *Agrostis Capillaris*, which he has, with great propriety, styled *Polymorpha*; for I have observed that none of the seeds of any of his varieties under *Polymorpha*, come up like the parent plant; for the seed of *Agrostis Alba* came up and blowed, some like *Stolonifera*, and some like *Capillaris*; and seed of the *Palustris* came up and blowed like *Alba* and *Stolonifera*.

*Alphabetical List of English Grasses.*

	No.		No.
Barley-Grafs Meadow	71	Fescue-Grafs Heath	65
Sea	72	Meadow	63
Wall	70	Purple	57
Wood	73	Sheep's	53
Bent-Grafs Brown	5	Spiked	62
Creeping	6	Wood	66
Dwarf	9	Tall	64
Fine	4	Viviparous	54
Marsh	7	Welsh	58
Silky	2	Wood	67
Small	5	Fox-Tail-Grafs Bulbous	22
White	8	Field	20
Brome-Grafs Barren	43	Floating	21
Ciliated	39	Meadow	19
Corn	41	Panic	24
Rough, S.	46	Sand	23
Soft	38	Hair-Grafs Blue	11
Tall	44	Crested	10
Upright	40	Early	17
Wall	42	Grey	16
Wood	45	Mountain	15
Canary-Grafs Manured	87	Purple	14
Reed	89	Silver	18
Sea	88	Turfy	13
Cat-Tail Grafs Branched	92	Water	12
Knotty-rooted	91	Hard-Grafs Sea	1
Meadow	90	Honey-Grafs Mountain	79
Cock-Foot Grafs Rough	51	Wood	78
Smooth	50	Lyme-Grafs Sea	52
Couch-Grafs	106	Mat-Grafs	81
Darnel-Grafs	76	Meadow-Grafs Annual	101
Dog-Tail Grafs Blue	49	Bulbous	99
Crested	47	Common	95
Rough	48	Creeping	100
Feather-Grafs	105	Fine	99
Fescue-Grafs Brome-like	59	Fen	104
Capon's-Tail	60	Great	94
Finest Sheep's, S.	53	Hard	93
Flote	61	Long, S.	97
Hardish	55	Marsh	96
Fine-leaved } Sea, S. } <td>56</td> <td>Narrow-leaved }</td> <td>98</td>	56	Narrow-leaved }	98

	No.		No.
Meadow-Grafs Reed	93	Quaking-Grafs Least	37
Sea	102	Middle	36
Spiked	104	Ray-Grafs	74
Mellit-Grafs	80	Paniculated	75
Oat-Grafs Hairy	33	Sea	77
Meadow	32	Reed Common	26
Tall	35	Hedge	27
Yellow	34	Sea	29
Oats Naked	30	Small	28
Wild	31	Soft-Grafs Couchy	69
Panic-Grafs Cock's-Foot	85	Meadow	68
Creeping	86	Spring-Grafs	25
Green	82	Wheat-Grafs Bearded	107
Loose	84	Smooth	108
Rough	83		

Long-Grafs RAY'S - - - - No. 7.

STILLINGFLEET'S 61.

SOLE'S - - - - 97.



## ART. XVI.

*On the NATURE of the DISEASE occasioned by the  
Bite of a MAD-DOG:*

Shewing the Cause why the Means hitherto employed have proved ineffectual, and why a more certain Method of Prevention and Cure ought to be adopted.

To which is prefixed, a Letter to the Author from Count LEOPOLD DE BERCHTOLD, on the efficacy of Olive Oil.

(By A. FOTHERGILL, M.D. F.R.S.)

Occasio precepit. HIPPOC.

Principiis obita, fero medicina paratur. OVIN.

" TO DR. FOTHERGILL.

" DEAR SIR, London, Sept. 30, 1798.

" I Shall not fail to make the best use in my power of your very interesting publication in Germany, as well as in other countries.

" I am overjoyed to read the account of the cure of T. C—— and his nurse, by the application of olive oil; and am fully convinced, that the following advice to use olive oil, as soon as an accident happens, ought to be followed,

" It has been mentioned, in the Gazettes of Hamburgh in the year 1792, that Dr. LOOF, an English physician, formerly established in Holland, has saved the lives of several people bit by mad-dogs, by giving them inwardly *pure olive oil*, made into a jelly, by mixing

mixing it in a clean earthen vessel with the yolks of two or three eggs on a slow fire, and stirring it continually.

“ Weights not always being at hand, when such an accident happens, the quantity of olive oil, which is to be used each time, has not been exactly determined by the weight, it has been said only, ‘ Break the shell of an egg in two, and fill one half of it with pure olive oil.’

“ Dr. LOOF orders to give this remedy *two days successively*, and *commencing as soon as possible*, observing, at the same time, *to keep the stomach empty six hours before, and as many hours after taking the medicine*.

“ The wound must be *kept open* during nine or ten days, and be *anointed every day with the medicine described*.

“ Several dogs have also been cured by taking a *double quantity* of the same remedy, which threw them into a most abundant and fetid sweat, and occasioned a very considerable loss of hair. Wherever the dogs rubbed their bodies against the white wall of the stable, they have been confined in, a spot has been left, which penetrated so deep into the wall, as to render it very difficult to scratch it away.

“ During my stay at Palma, the capital of the island of Majorca, I mentioned Dr. Loor’s remedy to the Governor of the place; and he told me, that he knew of it, and that it has also been used with success at Madrid.

“ The

“ The great quantity of dogs I saw at Lisbon, and the unaccountable behaviour of the inhabitants to those entirely abandoned and most unfortunate creatures, obliged me to translate the description of Dr. LOOF’s remedy into Portuguese.

“ As soon as I return to Vienna, I shall take the liberty of sending you a more circumstantial account of the cures Dr. LOOF performed by the above-mentioned medicine, which, I think, well deserves also a fair trial in England.

“ I could not enjoy a greater satisfaction than in being able to assure you personally, how much I honour you, and how sincerely I am,

“ Dear sir,

“ Your most obedient humble servant,

“ COUNT BERCHTOLD.

“ P.S. Permit me to present you with a copy of my *Descrizione del nuovo rimedio curativo e preservativo contro la peste.*”

INTRODUCTION.

THE illustrious foreigner who has honoured me with the above important communication, has long been ardent in his pursuit of useful knowledge. Having, like the British HOWARD, devoted his various travels to the best interests of humanity, he has

here added a fresh instance of his zeal and philanthropy. To him this country is indebted for the first intimation of the virtues of olive oil, in counteracting pestilential contagion; and here we are favoured with his sentiments concerning it as a preservative against the effects of the canine poison, requesting it may undergo further investigation.—Should the facts he has collected, respecting its success in both cases, be fully confirmed, it will constitute one of the most interesting discoveries of the present century.

The disease, produced by the bite of a mad-dog, having hitherto baffled all the efforts of nature—all the resources of art, is justly deemed one of the most formidable to which the human body is incident. Not a year passes without exhibiting terrible examples of its melancholy effects among the human species, independent of its ravages amongst flocks, cattle, and domesstick animals.

About four years ago, when it raged with uncommon vehemence in the eastern counties, a meeting was convened at St. Edmundsbury, for the laudable purpose of taking the matter into serious consideration, when the celebrated **ARTHUR YOUNG** gave the result of his inquiries, made in the neighbouring districts.

Among other affecting articles of intelligence, he  
“ reported the account he had received of the deaths  
“ of no less than eleven persons, occasioned by ca-  
“ nine

“ nine madness, besides twenty-four others, who,  
“ within the two preceding months had been bitten,  
“ and still remained in a dreadful state of suspense!

“ That in Suffolk, and some of the neighbouring  
“ counties, live stock, of the value of more than  
“ 1250l. had been bitten by mad-dogs! Nor is it (adds  
“ Mr. YOUNG) the mere amount of the loss that is  
“ sustained; it is the apprehension a man must feel  
“ at such a time, that going to bed free from calamity,  
“ he may rise involved in ruin. Such a state of inse-  
“ curity is dreadful, and ought not to be the fate of  
“ men, whose industry feeds the whole community.”

During the two last years, many instances of its  
deplorable effects have occurred, not only on this,  
but on the other side of the Atlantic; the disease  
having spread through several provinces of the United  
States, as appears from some late publications.

In the prevention, therefore, of so dreadful a ca-  
lamity, all ranks of people are materially concerned;  
but certainly none more so than country gentlemen,  
farmers, and agriculturists, whose persons and pro-  
perty are so peculiarly exposed. The subject, then,  
claims the attention of every patriotick association,  
instituted for the encouragement of agriculture, and  
the useful arts, and particularly that of the Bath and  
West of England Society, including a large district,  
abounding with flocks and herds; and at the same  
time, apparently super-abounding with the canine race.

*Canine Poison—its Peculiarities—whether soon absorbed  
—reputed Signs of Madness in Dogs—  
their Fallacy.*

THIS is, perhaps, the only infectious disease incident to brutes that is ever known to be communicated to man, unless the cow-pox should afford an exception to the general rule. On the other hand, contagious diseases, incident to man, are never known to be propagated to brutes. Nor is there any clear proof of this disease being communicated from man to man, or from man to brute.

The late Mr. JOHN HUNTER relates his having formerly inoculated other animals, both with variolous and syphilitic matter, without producing any symptom of the respective diseases.

Dr. VAUGHAN inoculated a dog with the saliva of a rabid child, without effect.

Dr. BABINGTON and Mr. CLINE, we hear, lately performed a similar experiment, by inoculating a dog, three rabbits, and some fowls, with the saliva taken from a person in the last stage of hydrophobia.

Mr. A. COOPER repeated this experiment on a healthy dog, with saliva taken from a dog that died mad.\* But in none of these experiments did any of the inoculated animals, at the expiration of two or three months, discover any signs of infection. The

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\* Researches by a Medical Society in London, vol. i.

dog last-mentioned, even at the end of twelve months, remained perfectly well.

The result of these experiments appears to be singularly curious. It is no less remarkable, that this and other animal poisons of the most deadly kind may be received into the stomach without injury.

“ The saliva of a mad-dog,” says Mr. BRUCE, the celebrated traveller, “ has been given to animals, “ and has not affected them.” The same is affirmed of the viperine poison, where a person had the temerity to drink a glass of wine imbued with the poison of an enraged viper, without experiencing any dangerous effects; though, according to FONTANA’s experiments, it sometimes destroys other animals, when given in large doses.

REDI and CHARAS, who also ventured to taste the viper’s poison, declared it resembled the oil of sweet almonds.

When the canine poison is first introduced into the human body by a wound, or small scratch, as in inoculation, it betrays no sign of acrimony, nor of an actual venomous quality. No violent inflammation, nor swelling of the lymphatic gland above the part affected, ensues, but the wound heals as kindly as any common sore. There it lies dormant an indefinite space of time, most commonly about six weeks, sometimes eight or nine months; and in some rare instances even eighteen months; till at length, when the accident is perhaps forgotten, it suddenly becomes

becomes active, produces a sense of pain, tingling, or numbness in the part, the first harbingers of impending mischief. To these succeed inquietude, restlessness, and an uneasy sensation about the throat: next follows, accompanied with tremendous spasms, and arrayed in all its terrors, that awful symptom the HYDROPHOBIA, which generally, on or before the end of the fourth day, completes its fatal career!

If the saliva of a rabid animal be the sole cause of the disease, by what secret means is its influence transferred to the organs of deglutition? Is it imbibed by the lymphatics, and its noxious quality exerted principally on the blood, as *Abbe FONTANA* imagines? Or does it not rather act on the nerves of the part affected? And is not the local irritation, according to an established law of the system, first propagated to the sensorium by nervous communication, and thence reflected back to the throat and salivary glands?

Thus, in a certain state and condition of the body, the mere puncture of a nerve or tendon, even after the wound is apparently well and cicatrized, is sometimes sufficient to produce the locked-jaw, interrupt deglutition, and convulse the whole system. In like manner may the epileptic paroxysm be sometimes traced to irritation, commencing in a remote part of the system, and gradually propagated to the brain by nervous sympathy.

Other

Other animal poisons, as that of the syphilis, or small-pox after inoculation, can be traced in their course to the next lymphatic gland, a circumstance not observable concerning the canine poison; which, if it be absorbed at all, remains at least, perfectly inert, without discovering any testimony of its presence till the moment it becomes active in the part, when it soon proceeds to discover its specific effects. Till then there is no disease, only a pre-disposition, which requires an occasional cause to bring it into action. Thus the poison, after remaining latent nine or ten months, has been suddenly roused into activity, by a bruise or injury of the part, by intoxication, passion, &c. While some persons are extremely susceptible of the infection, others are almost proof against it, like those who have been repeatedly inoculated without effect.

The long space that intervenes between the time of receiving the bite and the appearance of the disease, happily affords a very favourable interval for eradicating the poison, which, during its inactivity, may be safely considered, I presume, as entirely local. Other animal poisons infect almost every person in whom they are inserted—this happily but few. Of 120 persons bitten by supposed rabid animals, it has been asserted that only about 1 in 16 contracted the disease. Others, however, have calculated, that the average number may be at least 1 in 10 or 12; and M. BEBIERE assures us, that out of 17 persons bitten by

by a mad-wolf, 10 were infected. This, however, will vary according to the activity of the poison, the certainty of its insertion, the state of the body, and whether the bite be received through clothes, or the naked skin.

The poison being generated in the canine species only, as dogs, wolves, foxes, &c. it is no wonder that they appear to be more susceptible of the poison than man. Thus DR. HAMILTON informs us, that four men and twelve dogs were bitten by the same dog; the men escaped the infection, but the dogs all died mad.

Indeed, for want of a proper criterion of madness, dangerous mistakes are frequently committed. Thus a favourite dog, in the first stage of the disease, betrays no striking mark of the contagion, and is therefore caressed as usual; nor is he suspected of madness till he has bitten one or more persons in the family, and has afterwards died raving. While, on the other hand, many a harmless dog, that happens to be ill of some other complaint, is hastily pronounced mad, and falls a victim to unjust suspicion.

The reputed signs, mentioned by BOERHAAVE, and others, such as the dog's sullenness, down-cast look, and refusal of meat and drink, are common to other diseases; but if, in addition to these, he breathe short, foam at the mouth, shun, and be mutually shunned by other dogs, desert his master, run staggering in a curved line snapping at bye-standers, he

may

may (we are told) be presumed to be really mad. Doubtless; but may he not prove highly dangerous before he arrive at this last stage of the disease? Certainly, as will clearly appear in the sequel.

*Mr. MERNELL's Observations on the distinguishing  
Signs of Madness in Dogs.*

Mr. MEYNELL, a celebrated fox-hunter in Leicestershire, having paid particular attention to this distemper among his dogs, communicated to a physician the following remarks, in answer to some questions proposed to him on that subject. In order to prevent any mistake in a matter of such importance, I shall here present the reader with the result of his observations, copied *verbatim*, in his own words:

“The first symptom of canine madness in dogs is, I believe, a failure of appetite in a small degree. I mean, that the dog does not eat his usual food with his usual eagerness; though, if better food be offered him, he may eat it greedily. A disposition to quarrel with other dogs comes on early in the disease. A total loss of appetite generally succeeds; though I have seen dogs eat, and lap water, the day before their death, which generally happens between seven and ten days after the first symptom has appeared. A mad-dog will not, I believe, cry out on being struck, nor shew any sign of fear on being threatened; though he will, very late in the disease, appear sensible of kind treatment.

“I have

“ I have never known a mad-dog shew symptoms of the disease in less time after the bite than ten days; and I have known many instances of dogs having died mad as late as eight months after the bite. I think the symptoms generally appear between three and eight weeks after the bite.

“ A mad-dog, in the height of the disorder, has a disposition to bite all other dogs, animals, or men. When not provoked, he usually attacks only such as come in his way; but having no fear, it is peculiarly dangerous to strike at, or provoke him.

“ Mad-dogs appear to be capable of communicating the infection early in the disorder, and as soon as they begin to quarrel with, or bite other dogs.

“ The eyes of mad-dogs do not look red or fierce, but dull; and have a particular appearance, which is easily distinguished by such as have been used to observe it; but not easy to be described.

“ Mad-dogs never bark, but occasionally utter a most dismal and plaintive howl, expressive of extreme distress; and which those who have once heard, can never forget. So that dogs may be known to be going mad without being seen, when only this dismal howl is heard.

“ Mad-dogs do not foam or froth at the mouth, but their lips and tongue appear dry and foul, or slimy.

“ Though mad-dogs generally refuse both food and drink in the latter stage of the disorder, yet they never shew any *abhorrence or dread of water*, will

pass through it without difficulty, and lap it eagerly to the last. But it is remarkable, that though they lap water for a long time, and eagerly, and do not seem to experience any uneasiness from it, yet they do not appear to swallow *a single drop* of it; for, however long they may continue lapping it, *no diminution of quantity can be perceived.*

“ I am persuaded, that this disorder never originates from hot weather, putrid provisions, or from any other cause but the bite.\* For however dogs may have been confined, however fed, or whatever may have been the heat of the season, I never knew the disorder commence without being able to trace it to that cause; and it was never introduced into the kennel but by the bite of a mad-dog.

“ The hairs of a mad-dog do not stand erect more than those of other dogs. I do not know that there is any thing remarkable in the manner of a mad-dog’s carrying his head, or his tail. I do not believe that dogs are more afraid of a mad-dog than they are of any other dog, that seems disposed to attack them.

“ There are two kinds of madness, both of which I have known to originate from the bite of the same dog. Among huntsmen, one is known by the

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\* If not formerly generated in the canine race, how could the disease originate? How make its first appearance in a new country? May not the inbred cause that first produced it still exist, and continue to prolong its existence, independently of contagion? A.F.

name of *raging*, the other by that of *dumb* madness. In *dumb* madness, the nether jaw drops and is fixed, the tongue hangs out of the mouth, and slaver drops from it. In *raging* madness, the mouth is shut, except when the dog snaps or howls, and no moisture drops from it."

These remarks on the signs of this malady in dogs, from a person of Mr. MEYNELL's long experience and attentive observation, certainly demand serious consideration. As they differ widely in many particulars from received opinions, they may help to correct the errors of those who have stated imaginary symptoms, deduced from theory, or copied from the mistakes of former writers. Nevertheless, it may still be asked, are the loss of appetite, the disposition to quarrel, the dulness of the eyes, or the dryness of the tongue, peculiar to this malady? Or does not this train of symptoms rather seem common to other acute or febrile diseases?

Do not dogs, when ill of other complaints, sometimes preserve a sullen silence instead of barking? Do they not at other times, without any visible cause, or apparent indisposition, set up a dismal howl, "making night hideous?" How is this to be distinguished from the indescribable howling of a mad-dog, except by those to whom the peculiar sound of the latter is familiar? Whence is it that fear, and even the dread of water, the striking characteristics of the disease in man, are entirely absent in the

canine species? Are the two kinds of madness proceeding from the saliva of the same dog, as described by Mr. MEYNELL, to be considered as distinct species, or rather as varieties? Are they equally contagious, and alike fatal to human kind? May not the disease in the brute, as well as in the human subject, assume a maniacal or melancholic character, or even a mixture of these, according to the natural temperament and disposition of the individual?

As the long state of anxiety and suspense must be dreadful to those who are bitten by a dog even suspected of madness, is there any criterion of the canine malady after the death of the animal? Has instinct, as has been imagined, stamped on this sagacious creature a distinctive aversion to the peculiar odour, or aspect, of an infected dog?

If, according to popular opinion, a piece of raw meat be rubbed on the tongue and fauces of the dead animal, and if, on offering it to a healthy dog it be refused with abhorrence, is it a certain proof that the diseased dog died mad?

A satisfactory answer to the preceding queries would tend to clear up many doubtful points, but would demand reiterated experiments.

It is earnestly to be hoped, therefore, that Mr. MEYNELL, and other noted *amateurs* of the canine race, will bend their attention to this important subject, and favour the publick with their future observations.

From

From the united testimony of various writers, it now appears, (though it will, perhaps, scarcely be credited) that in the early stage of the disease, a mad-dog will eat and drink, and even fawn on the person upon whom he is about to inflict a mortal injury. An alarming consideration! and which demands from the publick more than ordinary precaution!

That no conclusion can be drawn from the mere taking or refusing food or drink, further appears from the following fatal incidents, and which ought to be a caution never to care for or be familiar with stray-dogs:—The son of a noted Admiral, aged 15, on the 6th of December, 1784, while stooping down to play with a little stray-dog, was bitten through the under lip. After it had bit him, we are assured, from the best authority, that “it eat meat and “lapped milk and water, and shewed no inclination “to bite the coachman, who tied a string round “its neck, and led it to the coach-house, where “it lived four days.”\* The boy was instantly sent, however, to the house of Mr. JOHN HUNTER, who saw him within a few hours after the bite. Every precaution was now taken—a caustic was applied to the wound, two physicians were also called in consultation; the Ormskirk, the Tonquin remedy, mercury and opium, were successively

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\* See London Medical Journal, vol. viii. p. 162.

administered.

administered. Nevertheless, on the 36th day the hydrophobia came on, and on the 38th the unfortunate youth died.

From the same dog, and on the same day, a poor French woman received a bite in her hand. Some days after, a caustic was applied to the sore more than once, and the usual remedies administered. On the 99th day she complained of pain in the part affected, on the 103d day appeared the hydrophobia, and on the 106th she died.\*

ROBERT PICK, bitten by the house-dog, (which, after the accident, being seen to eat and drink, no danger was suspected) was seized, however, with the disease about the 56th day, and on the 60th expired.†

LEVI WOODROOF accustomed a favourite little dog to lick an ulcer in the cavity of his ear, which at last seemed to scratch the sore and give pain, but without betraying any sign of ill-humour or indisposition. On the next day, however, the dog sickened—fell mad, and was killed. His master, within a month after the accident, felt an unusual darting pain in the ear, succeeded by the hydrophobia, which on the 4th day closed the fatal scene.‡

JAMES REMINGTON, a boy of six years old, on the 28th of October, 1797, was bitten in the face and lips by a neighbour's dog, not supposed to be

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\* London Medical Journal, vol. vii. p. 89, and seq.

† Medical Researches, vol. i.

‡ Medical Repository, Philadelphia, vol. i. 1792.

mad. On the 10th day after the accident the boy fickered, on the 11th came on the hydrophobia, and on the 13th he died.—In this instance, how early the seizure! How rapid the progress!\*

From these alarming cases, we learn, that a dog may arrive at an advanced period of the disease without refusing food, or shewing the distinctive marks of madness.

2dly. That the poison is more speedily brought into action when the bite is in the face or lips, than in the extremities, according to what has been observed by the best authors.

3dly. That unless the poison be entirely eradicated, neither the caustic nor the most celebrated remedies can avail. If a dog, therefore, without any visible cause, should betray any sign of indisposition, or actually bite a person, he ought (instead of being killed, according to the vulgar practice) to be confined in a safe place, and narrowly watched: if he were really mad, the disease will soon shew itself, and he will infallibly die within a few days.

### *Of Worming Dogs.*

If the operation of *worming*, (as it is called) which is performed by extracting a small worm-like filament seated under the tongue, can, as some experienced sportsmen affirm, either prevent madness in dogs, or

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\* Medical Repository, vol. i. p. 340.

even render them harmless under the disease; by destroying their propensity to bite, no dog ought, in future, to be suffered at large *unwormed*. Though this operation be extolled by some, it is despised and ridiculed by others; it is to be hoped, therefore, the knights of the kennel, who are materially interested in the question, will endeavour to clear up this and other disputed points by decisive experiments.

On examining this white worm-like substance, which is about two inches long, originating under the point of the tongue, and extending longitudinally between the hyo-eidei and stylo-hyo-eidei muscles, it is, I find, a natural portion of the tongue slightly attached to a gland at each extremity; of a cylindrical form, dense, and resembling a tendon. Its extraction does not visibly injure any of the animal functions, and its use remains wholly unknown. Having lately discovered it to be tubular, may it not be an excretory duct, or necessary appendage to the adjacent salivary glands? May not its removal influence the secretion of mucus or saliva, or in some measure divest it of the power of contracting a contagious quality?

*Prevention by Internal means, a source of Error—  
Antidotes, their unmerited Repute.*

The contagious bite of a rabid animal may be considered under three distinct periods. The first, from the time of the accident to the moment the poison becomes active in the wound. The second, from that period

period till the dread of water appear. The third, from the first appearance of that symptom to the close of the disease.

The treatment of the first and second consists of the various means of prevention. That of the third, the methods of cure after the disease has actually made its appearance.

Though no certain cure of the hydrophobia has yet been discovered, yet, if by timely precaution that dreadful malady can be prevented, as in general I think it undoubtedly may, prevention in the first instance will be acknowledged to be better, though less brilliant, than cure.

Among the various modes of prevention hitherto employed, the grand error, I am convinced, has been in treating a local affection as a general disease; and in trusting the cure to certain internal remedies, considered as antidotes; while the poison has been suffered to lie dormant in the wound, and consequently far beyond their reach.

May not this be the principal reason, why the disease has, during these 2500 years past, uniformly triumphed over all the boasted remedies that have been invented? Such as Sea-bathing, PALMARIUS's Powder, the Lancashire and the Ormskirk remedies, Dr. MEAD's remedy, the Tonquin remedy, DE SAULT's and Dr. JAMES's mercurial remedies, &c. Also the Tanjore remedies, celebrated in the East-Indies as infallible antidotes, consisting of a powder and

and a pill ; the former is composed of three drams and a half of the dried leaves of *Datura Stramonium*, or thorn-apple, repeated three days successively, which in a few hours produce intoxication ;—a remedy which demands no small circumspection, since, according to Dr. ANDERSON, the seeds of a single apple are found sufficient to cause immediate apoplexy and death, and are too often employed by the natives who deliberately perpetrate suicide.

Dr. DE WITT, an American practitioner, informs us, that this plant produces not only intoxication and madness, but sometimes real symptoms of hydrophobia.\* The Tanjore pill consists of arsenic, mercury, and pepper, equal parts, with three other unknown poisons. Of eleven persons bitten by mad-dogs, and treated with this remedy, all are said to have remained well at the end of five months, while three others, for whom nothing was done, died of hydrophobia within a month after the bite.† But the wounds of the former being dilated and daily dressed with mercurial ointment, are we to attribute the success to the pills or the mercury ?

The Belladonna, so highly extolled in Germany, has lost its reputation in France. Being administered in doses of fifteen and even twenty grains a fortnight before the commencement of the disease, caused ex-

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\* Medical Repository, vol. ii. p. 33.

† Medical Journal, vol. x. p. 289.

trete dryness of the throat, and many formidable symptoms, but did not prevent the fatal dread of water. Practitioners who thus attempt to drive out one poison by dint of another, ought to reflect that an overdose of the remedy may prove as destructive as the disease; and that the latent enemy is not to be driven out, *vi et armis*, by internal remedies, however potent. The whole class of boasted antidotes have had their day—many have already sunk into oblivion, and the rest seem “ hastening fast to the “ tomb of all the Capulets!” The unmerited repute which they have obtained admit of a ready solution, as it is much easier to propagate a hundred errors than to demonstrate a single truth.

The late Mr. HUNTER relates a remarkable circumstance, of twenty-one persons being bitten by a dog that proved to be mad: nothing was done for any of them, and only one was taken ill of the disease. Had they all taken some noted antidote, its fame would have been spread abroad of having completely cured twenty out of twenty-one.

How often does it happen, that people are bitten by dogs ill of other diseases, not the least tending to madness? The animals are killed on a groundless suspicion; the parties post away to the sea, or have recourse to some pretended specific, equally ineffectual; they remain well, and the remedy acquires the credit of having cured a distemper that never existed, or of preventing one that could never have occurred

and a pill; the former is composed of three drams and a half of the dried leaves of *Datura Stramonium*, or thorn-apple, repeated three days successively, which in a few hours produce intoxication;—a remedy which demands no small circumspection, since, according to Dr. ANDERSON, the seeds of a single apple are found sufficient to cause immediate apoplexy and death, and are too often employed by the natives who deliberately perpetrate suicide.

Dr. DE WITT, an American practitioner, informs us, that this plant produces not only intoxication and madness, but sometimes real symptoms of hydrophobia.\* The Tanjore pill consists of arsenic, mercury, and pepper, equal parts, with three other unknown poisons. Of eleven persons bitten by mad-dogs, and treated with this remedy, all are said to have remained well at the end of five months, while three others, for whom nothing was done, died of hydrophobia within a month after the bite.† But the wounds of the former being dilated and daily dressed with mercurial ointment, are we to attribute the success to the pills or the mercury?

The Belladonna, so highly extolled in Germany, has lost its reputation in France. Being administered in doses of fifteen and even twenty grains a fortnight before the commencement of the disease, caused ex-

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\* Medical Repository, vol. ii. p. 33.

† Medical Journal, vol. x. p. 289.

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occurred from that cause. How easily are the generality of mankind seduced into a belief of what they wish to be true!

Thus, by implicit faith in pretended specifics, and boasted cures that never existed, is modern quackery supported in luxury, at the expence of British credulity; while fortune, health, and life are daily sacrificed to the rapacity of desperate and designing impostors!

### *Prevention by External Means.*

The external means of prevention may be performed by ablution, by suction, by extirpation, and by the application of oleaginous substances.

*Ablution.*—In the bite of a mad-dog, the first care ought undoubtedly to be to remove as speedily as possible every particle of the poison. For whether it be acid, alkaline, or neutral, water is the universal solvent of all saline bodies. Therefore, after the wound has bled freely, and been well wiped with a dry cloth, it ought to be diligently washed for the full space of an hour, with a solution of soap in tepid water. This may be done by a soft sponge, a watering-pot, or, perhaps, still better by a syringe.

In slight superficial wounds such a copious ablution alone might possibly be sufficient to prevent future mischief, yet ought not, I think, to be entirely depended upon, without the following precautions; which may, it is presumed, add considerably to the patient's security.

1st, Previous

1st. Previous to the process, let a tight ligature be applied to the limb, a little above the wound, a circumstance that ought always to be premised; otherwise the poison, independently of absorption by the lymphatics, may be conveyed by filtration from cell to cell along the reticular membrane, which invests every fibre of a muscle, and may therefore spread to a certain space beyond the circumference of the wound.

2d. If the wound be deep, or in an oblique direction, it ought to be first properly dilated, and a cupping-glass applied to encourage a plentiful flow of blood.

3d. After the wound has been well washed, as above-mentioned, let the first dressing consist of dry lint, to absorb the blood and moisture; next morning let the whole surface of the wound be touched in every part with the antimonial or lunar caustic, and kept open at least two months.

*Suction.*—In the Highlands of Scotland the natives, on receiving a bite from a mad-dog, or viper, immediately suck out the blood and poison; and in the next place, having stuffed the wound with cobwebs, (an absorbent animal substance) give themselves no further concern, and are said to remain free from the infection.

In like manner, and with similar success, have certain savage tribes long been in the habit of sucking recent wounds, inflicted by poisoned arrows or by

rabid

rabid animals; a practice more rational than that which is commonly pursued by more polished nations. While the suction promotes a plentiful flow of blood from the wound, the saliva tends to blunt or subdue the activity of the poison; the operation may, therefore, be performed with safety, and without loss of time, either by the person injured or an attendant, provided his mouth be free from any sore or excoriation: but to avoid even suspicion of contagion, the suction may be tolerably performed with a syringe.

*Extirpation.*—Of all the external means, the complete extirpation of the injured part is now generally allowed to be the surest method of prevention.—When the accident, however, happens in the lips, or about the face or neck, it becomes a delicate point, and may occasion no small embarrassment. Indeed, most patients will rather risque the consequence than submit to the operation. In such cases, I have occasionally advised the more gentle methods already described, and hitherto with invariable success.—The advocates for absorption contend, that extirpation can avail nothing, if delayed beyond the first day; which is a dangerous mistake. For I once recommended it, and saw it performed with success, about the 7th day; and have lately heard of a remarkable case where it was undertaken on the 28th, and of another after the wound had been cicatrized, and pain begun to be renewed in the part; and yet, in none of these cases did any disease ensue. In short,

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if absorption take place at all, it probably does not commence till the part affected begins to inflame afresh, and grow painful. I therefore should not now hesitate to recommend the operation at any intermediate period, from the accident till the commencement of the disease. Whether it can avail after the commencement of the dread of water, may, perhaps, deserve a trial. That even at this period, the poison still remains local, and neither affects the solids nor fluids, nor any of the secretions, the saliva excepted, seems probable from this consideration, that not only the flesh and milk of cows bitten by rabid animals have been used with impunity, but even the liver of the mad-dog himself has often been taken as a remedy, without communicating the disease. Since neither nurses, who inhale the patient's breath and wipe away the viscid saliva, nor surgeons who open the dead body, receive any injury or infection, the faculty and attendants may safely discharge their duty to the sick without fear or apprehension.

Extrioration may be performed by the knife, or by caustic, according as circumstances may point out. The former, being more expeditious and less painful, claims the preference; besides, in cutting out the diseased part, the mark of the tooth may be more carefully traced, and the line of separation better defined. To whatever depth the bite may penetrate, the incision ought certainly to extend beyond it in every direction. For should the minutest particle

of the poison be suffered to remain, there can be no security. Here a necessary caution occurs respecting the knife, probe, and other instruments employed in empoisoned wounds, concerning which surgeons cannot be too circumspect. An inoculating lancet, used by mistake in bleeding, has unhappily, in more than one instance, communicated the infection. So in the present case, the knife imbued with the canine poison may, through inattention, not only extend the infection to sound parts, and thus defeat the purpose of the operation, but perhaps afterwards—dreadful thought! unfortunately inoculate other persons. That this poison, after lying dormant nine months and upwards, may renew its activity, has been already noticed: therefore, to eradicate entirely any particles that may have eluded the operation, it will be further adviseable again to wash out the wound carefully with soap and water, and afterwards apply to its whole surface a solution of the caustic fixed alkali, (the *Kali purum* of the new Dispensatory.) After this, should any infection ensue, it can only be attributed to the over-tenderness of the operator, or his inattention to the minuter circumstances above-mentioned. Thus, in the unfortunate case of the Admiral's son, already noticed, the caustic is said to have been carefully applied to every part of the wound, only a few hours after the accident, by that expert surgeon and anatomist Mr. JOHN HUNTER, and yet the event

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but too sadly proved that some minute particle of the poisonous saliva had eluded the operation. Even the blood, issuing from the wound, unless previously absorbed by dry lint, may defeat the action of the caustic. To the efficacy of the *Kali purum*, applied to the part, the reports of the Manchester Infirmary bear testimony; this having been the practice these fifty years, from the foundation of the hospital. Of forty persons bitten by mad-dogs, being thus treated, all are reported to have remained well.\* But whether the *Kali purum* act in common with the antimonal and lunar caustics, or, in addition to its causticity, possess a specific power from its alkaline quality, must be left to future observation. Instead of destroying the part with caustic alkali the Parisians prefer the application of nitrous acid.

The great BOERHAAVE, instead of extirpation of the part, appears to have trusted to ablution, cupping, with scarification, and afterwards dressing the wound daily with a solution of marine salt in vinegar.

Professor MEDERER condemns the method of extirpation, as cruel and unnecessary, and risques the event on the daily application of a dilute solution of lunar caustic in distilled water, in the proportion of thirty grains to a pint. In proof of its success, he adduces five cases duly authenticated.†

\* Dr. FERRIER's Essays, vol. iii.

† Medical Facts and Observations, vol. i.

Others, less tender towards the patient's feelings, propose to cleanse and enlarge the wound by the explosive force of gunpowder.

The ancients, on these occasions, universally employed the actual cautery, by which they presently destroyed the infected part, reducing it to ashes. A mode of prevention superior to all the pretended improvements introduced by modern refinement.

Through prejudice and disuse, the imagination is apt to revolt at the idea of the red-hot iron, and hence few persons, at this period, will submit to undergo the fiery ordeal. Mr. LE ROUX, for this reason, prefers the liquid butter of antimony, which, he says, has succeeded in a variety of cases. But it matters little, whether the part affected be removed by the actual or potential cautery, provided it be done effectually; for the pain in either case, though sharp, can only be momentary.

*Mercury.*—M. DESAULT, conceiving the contagion to originate from animalculæ, existing in the saliva of rabid animals, pronounced mercury the grand vermifuge, and only efficacious antidote, on which he could depend. Neither he nor his followers pretend, indeed, ever to have seen the supposed insects, though they might easily have been detected, if present in the saliva, by means of a good microscope. It were to be wished, therefore, that the theory should still be brought to the test of this simple experiment. Dr. JAMES caught the idea, and pursued

sued the mercurial plan internally and externally; while others, both at home and abroad, eagerly adopted the remedy, if not the doctrine. In short, Mercury and the Ocean, having of late usurped the empire of medicine, and supplanted other remedies, seem now to reign over the fashionable world with nearly equal sway. In spite, however, of their united forces, this all-powerful enemy persists in maintaining his wonted superiority.

Nay, even admitting the disease to be animalcular, the conclusion drawn from that theory is still untenable. Mercury is by no means a sure vermicule, since it appears, from a late observation, that a person who had just undergone a severe mercurial course, both internally and externally, evacuated, nevertheless, forty-seven live worms.

The writings on this subject exhibit a chaos of contradictions, irreconcileable to this or any other theory. The advocates for mercury consider it as the only specific: its opponents condemn it in *toto*, as highly pernicious. Some urge it to the point of copious salivation; others labour to prevent that tendency.

M. BONNEL thinks no disease is treated with more certainty than this; but it ought to be particularly noted, that his method consists in applying mercurial ointment to the wound for ten days, interposing purgatives on the intermediate days, to prevent salivation. Having, during the space of thirty years, tried it with success on 500 men and cattle, bitten by mad

animals,

animals, and M. DU CHOISEL in 300 more, M. BONNEL considers this treatment as confirmed by 800 trials. Where it has failed, it is attributed to its being used too late, or to mismanagement.\*

On the other hand, M. LE ROUX recites many lamentable examples of the inefficacy of mercury applied in the ordinary way, even when carried to the point of deep salivation. Indeed, no instance, I believe, can be produced of success from mercurial friction, unless in those cases recited by M. BONNEL and others, where the unguent was applied immediately to the wound.

*Oleaginous substances.*—The ancient remedy against the bite of the viper was long confined to the fat of that reptile, till it was at length discovered that olive oil was equally efficacious—a circumstance since well-known to viper-catchers, and confirmed by reiterated experiments. Whether it act by a specific power, or merely by inactivating the poison, or otherwise destroying its activity, matters not; the fact has always appeared to me interesting, and the analogy obvious. Whatever share of success the mercurial ointment may have had in counteracting the canine poison, it has invariably been attributed to the mercury; but I have long suspected it ought rather to have been ascribed to the oily quality of the lard, with which it is compounded, and which constitutes two-thirds of the composition.

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\* See Mem. de l'Acad. de Med. à Paris, vol. vi. p. 280.

To form a just estimate of the cures attributed to mercury, we must take into the account the other means employed at the same time. Thus M. BAUDOT, M. BOUTEILLE, and other French practitioners of eminence, unwilling to trust to the above mercurial process alone, expressly order the wound to be first carefully anointed with warm olive oil.

M. LE ROUX and his followers, who rejected mercury, and attributed their success to the antimonial caustic alone, employed nevertheless an ointment, consisting chiefly of fresh butter, to dress the wound.\*

In this and other obstinate diseases of the convulsive kind, the ancients anointed the body with warm oil; a practice too much neglected by modern practitioners.

Conformable to this idea appears to be Dr. LOOF's oleaginous medicine, which now properly comes under consideration. The yolk of egg, though probably destitute of any specific power, yet (as an animal mucilage well adapted to render the oil miscible with the animal fluids, and also to reconcile it to the stomach) seems a proper addition; nor need there be much exactness from an apprehension of an over-dose. A domestic remedy so simple, so innocent, and so well recommended, is certainly intitled to a full and candid trial in this country.

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\* Mem. de l'Acad. vol. vi.

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That the human body may be thrown into a copious perspiration by friction with warm olive oil, is a circumstance unnoticed till lately. The effects of this process, as practised at the Smyrna Hospital, in the prevention and even cure of the plague, in the first stage of infection, are related by Count BECH-TOLD, in his late interesting tract on that subject;\* and since confirmed by the testimony of Father LEWIS, superintendant of the hospital.

If olive oil, then, be really a preservative against the poison of the incensed viper, and even the pestilential contagion itself, is there not reason to suspect that oil and oleaginous substances may have had a greater share in counteracting the canine poison than the votaries of mercury ever imagined?

It is not pretended, indeed, to be a certain, only a probable remedy, after the hydrophobia has actually commenced; analogy affording only a presumption, not a proof; nor can its efficacy be fully ascertained, but by repeated trials and attentive observation. As the prevention depends on due management of the wound, this medicine is judiciously ordered to be applied externally for several days. On this, probably, and this alone, ought the main stress to be laid; yet, to calm the patient's mind, and to strengthen his hopes of security, it

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\* Descrizione del nuovo rimedio curativo e preservativo contro la peste.

may not be amiss to give the oil also internally, according to the directions. Previous to this plan of treatment, however, the wound ought to be diligently washed and cauterized.

If it cure dogs after the infection has taken place, it is a remarkable circumstance; but still more so, if it effect this by throwing them into a *profuse perspiration*. This must certainly be a mistake. Dogs, indeed, perspire copiously from the lungs, but assuredly never from the skin, even in the severest fox-chace. May not this peculiarity in the canine race be one reason why the disease originated with them? And also, why they are more liable than other animals to propagate this horrible contagion? May not a defect in the exhalation from the lungs, aided by other concurring causes, tend to bring on a diseased action of the salivary glands, which, by increasing and vitiating the secretion, converts that bland fluid into a subtle poison?

As the gastric liquor of a healthy animal has the singular property of counteracting animal poisons taken into the stomach, might not this fluid, applied to the envenomed wound, tend to destroy the activity of the canine poison?

As the saliva differs very little from the gastric liquor, may it not, in the act of sucking out the poison, add to the security by subduing any minute remnant lurking at the bottom of the wound?

Mr.

Mr. WHITAKER, an intelligent member of the Bath Agricultural Society, has just now favoured me with the following remarkable fact, which tends to corroborate this opinion:—Two persons, very nearly related, had the misfortune to be bitten, at the same time, by a mad-dog. One of them, being bitten in the thumb, immediately sucked the wound diligently till the blood ceased to flow; and without using any other precaution, remained well. The other, whose lip had been lacerated by the dog, being disabled from sucking out the poison, had immediate recourse to the usual remedy—sea-bathing, and with the usual event. The infection took place, the hydrophobia came on, and death ensued.

As this safe and simple method by suction requires no medical apparatus, can be instantly performed abroad or at home, either by the party or a companion, with little loss of time or delay of business, ought it not to be earnestly recommended to all persons remote from medical aid, particularly shepherds, husbandmen, and agriculturists? Nor need this preliminary step be any hindrance in prosecuting at leisure the other modes of prevention, which have been considered as most effectual. Were these diligently pursued immediately after every accident of this nature, it is presumed, the hydrophobia would very rarely, if ever, appear. After the proper precautions, therefore, have been duly observed, the patient may be encouraged to banish anxiety,

anxiety, and rest in full assurance of his safety. He may also pursue his usual manner of living, and frequent cheerful company; abstaining, however, from every kind of intemperance, or being hurried away by gusts of anger, or other strong passions. No internal remedies at this period have been insisted upon, because none seemed necessary, nor could they, for reasons assigned, add to the security.

*Hydrophobia—its intractable Nature—its Phenomena explained—new plan of treatment proposed.*

The spontaneous hydrophobia, or that difficulty and dread of swallowing liquids, which sometimes (though very rarely) occurs in certain fevers, also in hysterical and hypocondriacal affections, ought in no wise to be confounded with the genuine disease now under consideration, and which always proceeds from the canine poison alone.

Whether the cases described by Dr. NUGENT and other writers, and said to have been cured by the Tonquin remedy, mercury, opium, &c. belonged to the former or latter species of disease, seems at least problematical. Certain it is, however, that in the genuine hydrophobia, not these remedies only, but the whole class of boasted specifics have since been repeatedly tried in vain. Among various others, mercury has been pushed, both internally and externally, beyond the bounds of prudence. Musk, camphire, and valerian, in immoderate doses, and opium

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in quantities sufficient to impose a perpetual *quietus* on the most frantic maniac. Here a singular circumstance sometimes happens, not less surprising to the spectators than mortifying to the faculty. The hydrophobia on a sudden ceases unexpectedly, the patient calls for liquids, and drinks without difficulty. His friends rejoice, and fondly flatter themselves the danger is over, and that the remedies have triumphed over the disease; when, alas! the momentary calm, the most fatal of all signs, forebodes a palsy of the vital organs, the immediate precursor of death! Hence the extreme abuse of mercury and opium is, perhaps, sometimes not less destructive than the disease.

Bleeding has been performed repeatedly, and sometimes carried to an extravagant length, though it served but to exhaust the strength, and hasten on the fatal period.—What remains then? Are we to give up the disease as totally incurable? Or ought we not rather to quit the beaten track, and strike out some newer road, that may afford a more promising prospect? Other animal poisons of the most virulent kind have been often treated with success. Is this the only one, then, to which nature has denied a remedy? Banished be such a degrading idea, which at once tends to create despondency, to damp the spirit of enquiry, and to shut out improvement. Hence, perhaps, it is, that medical practitioners still content themselves with re-tracing the same hopeless path, so often trodden by their predecessors; though they cannot

cannot but be aware that it leads to certain and fatal disappointment.

That remarkable change by which the canine saliva is transformed into a dangerous poison, probably depends on some slight decomposition or alteration in the arrangement of its constituent parts, not more difficult of solution than some other chemical processes with which we are familiar. Mercury, a fluid destitute of acrimony, by being combined with a certain portion of marine acid, is converted into corrosive sublimate, a virulent poison; by an additional quantity of mercury into calomel, a mild and innocent medicine. An alkali may be rendered perfectly mild, or highly caustic, at pleasure, by merely adding or withdrawing its fixed air. The corrosive sublimate is presently disarmed by an alkali, the viper's poison by oil. Is there not then some reason to hope, that the canine poison may be counteracted by this, or perhaps some other simple, well-known substance, which, when once found out, we shall blush at our unaccountable indolence, or blindness, in not having discovered sooner?

The nature of the symptoms denotes a high degree of morbid sensibility in all the organs of sense, which renders the body "tremblingly alive" to every impression. Hence the eye becomes impatient of light, the ear of sound, and the touch of cold air feels intolerable.—Hence, also, a violent excitement of the nervous power in some parts, a torpor in others,

ethers, and an irregular distribution in all. The vehement excitement produces a proportionate exhaustion, and the vast expenditure of sensorial power, a rapid decay of strength. The livid hue of the face and lips shews a defect of oxygenation of the blood, the dilatation of the pupils and derangement of the faculties demonstrate the want of energy of the brain; and the convulsions, the strugglings of a dying animal. In short, a preternatural sensibility, joined to universal debility, characterizes the disease; while a peculiar sympathy between the local injury and the muscles of deglutition points out a striking analogy between this malady and the locked-jaw. The former, however, proceeds from an envenomed wound, the latter not; which constitutes an essential difference, and is perhaps the cause why the former renders the gullet so exquisitely sensible, as to become impatient even of its natural stimulus, the saliva. Hence the quantity of frothy spittle, which the patient indignantly spits out as fast as it is secreted. Hence the immediate pain and strangulation on his attempting to swallow any liquid, however mild. Hence, too, the horror and convulsions which, by association of ideas, attend the very sight or mention of it.

The canine poison seems to attack the oxygenous principle of the blood, the probable source of irritability and of life. Hence the depressed unequal pulse, the chilliness of the extremities, accompanied with internal heat, the melancholy aspect,

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the dejection of spirits, and the general absence of fever.

No wonder that an inspection of the body, after death, reflects no material light on the nature of the symptoms; the throat and internal organs generally appearing quite natural. The partial appearance of inflammation, which is sometimes discovered, is by no means essential to the disease, but may be considered as an effect of the convulsive spasms; or, perhaps, rather of the mercurial or other powerful remedies employed.

From this view of the disease, it appears, that the hydrophobia may be considered as a species of spasmodic angina, produced by specific contagion, which exerts its influence, first on the injured part, and afterwards on the organ of deglutition. 2dly. That the local stimulus, being propagated to the brain, excites the moving powers of the system into re-action; and hence the convulsive motions which speedily exhaust the strength, and finally extinguish the vital principle. 3dly. That profuse bleeding may prove highly injurious. 4thly. That the forcing down large quantities of liquids is a cruel practice, as it cannot but increase the spasms, and exasperate the malady.

*Indications of Cure.*

The chief indications of cure appear evidently to be the following:—

1st. To dissolve the fatal connection between the injured part and the organ of deglutition.

2dly, To

2dly. To calm the violent spasms, and soothe the nervous system.

3dly. To support the strength, and invigorate the whole frame.

To answer the first of these indications, much still depends on external means, and close attention to the injured part. The moment any darting pains, attended with numbness and discoloration, are perceived, they denote the poison to be in an active state, and that no time ought to be lost in prosecuting the most vigorous measures. The period from the commencement of these symptoms to the approach of the hydrophobia is uncertain, and perhaps rarely exceeds five or six days. To prevent, therefore, the irritation being propagated to the throat, let the suspected part be immediately cut out, and the surface of the wound duly cauterized. If any difficulty of deglutition has already been felt, let a sharp blister, or sinapism, be applied to the throat, extending from ear to ear. For unless the morbid impression can be obliterated by one yet stronger, and the natural action of the sympathizing parts speedily restored, there can be but small hopes of success.

A malady so rapid in its progress, so intractable by nature, demands Herculean remedies; and warrants a prudent trial of the most active substances with which we are yet acquainted. The Atropa Belladonna, in doses of four or five grains, has been highly extolled by some German professors; the

lauro-cerasus

lauro-cerasus half grain, and arsenic  $\frac{1}{8}$  th, by others. The hyoscyamus niger, in form of extract, given in doses of 15 or 20 grains in cases of fixed melancholy, attended with horrors and obstinate watchings, I have sometimes found very beneficial. It moreover procures sleep and composure of mind; often where opium fails, or even adds to the inquietude. Now these potent remedies, with due caution, may be tried in succession; if they fail, they only share the common fate of former antidotes; if but one of them should answer, it may afford an important addition to our stock of knowledge.

2dly. To assuage the spasms, and soothe the nervous system.

To effect this, after the hydrophobia has actually appeared, all impediments, and whatever may hurt the acute feelings of the patient, or by the power of association tend to aggravate his sufferings, must be first carefully removed. No dog must, on any account, be allowed to enter the room. Not water only and other liquids, but all glaring colours and glass mirrors, must be kept entirely out of his sight. No loud noise, nor cold air, must be suffered to molest him.—Having thus removed impediments, we must next endeavour to assist nature, in alleviating the spasms, and in procuring a lucid interval. If there be any critical evacuation in this disease favourable to our views, it must, I conceive, be that of sweat.

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beginning

In the cures recorded by Dr. NUGENT and others, in five or six cases of the hydrophobia in an advanced state, the treatment was different in each, yet there was one circumstance common to all, and that was a copious sweat. Till that appeared, the recovery appears to have been very doubtful. Nor is the case described by VAN HELMONT an exception; the patient being plunged into the cold-bath till half dead, the cure was attributed to the fright, but ought rather to have been ascribed to the re-action of the system, which, being aided by a warm bed and sudorific regimen, terminated in a salutary sweat. In a subsequent experiment of this kind, equally terrific, no sweat ensued, and the disease soon proved fatal.

Sudorifics indeed seldom produce a copious sweat, unless their operation can be assisted by warm diluting liquors. Hence perhaps it is, that musk, valerian, opium, and other powerful sudorifics, have so often failed. Given merely as antispasmodics, without proper dilution, they serve but to flatter hope at the expence of disappointment; let, therefore, the following method have a fair trial:

In a pint of olive oil dissolve half an ounce of camphire; let the entire surface of the body be diligently rubbed with this solution, made warm, continuing the friction before a gentle fire till the whole be expended. After which, let the patient be covered with a flannel and put into a warm bed, till a copious perspiration be procured. This may be encouraged

couraged by an enema of warm wine whey, with an addition of volatile alkaline spirit, or Eau de Luce, which last has long been deemed a noted specific in France. The part affected, and also the neck and spine, ought to be well embrocated twice a day with tepid oil; which, by soothing the nerves, may act as a powerful anodyne and antispasmodic. Could an entire bath of oil be had, it would be perhaps greatly preferable to a common bath of warm water.

A patient, in consequence of the poison of arsenic, had long suffered severe pains and convulsive spasms over the whole surface of his body, which resisted various internal and external remedies, till he was ordered by M. BOUTEILLE to be placed for the space of an hour, at proper intervals, in a bath of warm oil, by which he was soon completely cured.

If musick has charms to harmonize the nerves and sooth the feelings of the melancholy or outrageous maniac, as mentioned on the highest authority, and confirmed by the ablest physicians of antiquity; can any cause be assigned, why, in a musical age like the present, its powerful influence should not be tried against this dreadful malady? Though its effects on the disease occasioned by the tarantula may have been greatly exaggerated, yet, if what has been confidently asserted of its efficacy against the envenomed bite of the most dangerous serpents be true, the analogy would afford at least a presumptive argument in its

favour. But independent of this, other instances of its beneficial effects, in removing the wild ravings in certain fevers, might here be produced.\* And it was considered by CLINEAS, ASCLAPIADES, and ARCTÆUS, as an essential remedy in phrenzy, melancholy, and mental derangement.

In the memoirs of the Medical Society of Paris, vol. vi. is an affecting instance of a youth of twelve years old, who died of the hydrophobia. The distressing scene near the close of the disease induced the physician to try the effects of musick, by playing before him on the guittar. The harmony, even at this late period, we are told, appeased the spasms, and rendered the pulse more calm and regular.

3dly. To support strength and restore the energy of the brain.

To enable the patient to bear up under the unequal conflict, his diet should consist of the most nutritious aliments, chiefly of the solid kind, to which may be added fresh eggs, jellies, and bread soaked in generous wine. If, from his dread of liquids, neither food nor medicine of the fluid kind can be got down, they must be conveyed in the form of medicated baths and enemas; of which the body, being in a parched absorbent state, will imbibe more than is generally imagined. Might not liquids be also safely conveyed into the stomach with a flexible tube, as in cases of suspended animation?

\* See Medical Journal, vols. i. ii. and xi.

To restore oxygen to the blood, and invigorate the whole system, vital air, properly modified, may be inhaled into the lungs. Where this cannot be had, as nitrous acid contains it in a loose state, and readily detached, the acid may be diluted with a portion of water and administered as above-mentioned.

Should a considerable truce to the violent symptoms be once happily obtained, the return of paroxysm might possibly be obviated, by a liberal use of Peruvian bark with steel, and by repeated oxygenation.

To conclude, should the present hints tend, in any degree, to elucidate the real nature of this formidable malady, or lead to a more successful treatment, I shall think the labour well bestowed. Various experiments are still wanting, and the subject would require a more ample discussion; but having already over-stepped my intended bounds, I must here beg leave to drop the pen.



## ART. XVII.

*Describing a Pair of HARROWS and a DRAG.*

[From Mr. WINNE.]

To the Bath and West of England Agriculture Society.

GENTLEMEN,

INCLOSED I send you a plan of a Harrow, of my invention, which seems to me to possess some advantages over any I have yet seen. If you think it better than those in common use, you will, I dare say, give it a place in your useful publication.

I have examined Mr. TREFRY's harrow, (a description of which, with a plate, is given in the 43d article of your 4th volume.) Most of the objections which he mentions to the common harrow, struck me with as much force as they did him; whether mine obviate them better than his, it remains for you to determine.

The advantages which my harrow seems to me to possess over Mr. TREFRY's are these:—Mr. TREFRY's harrow, by once passing over, works (I think imperfectly) a piece of ground five feet eight inches broad, that being the interval between the extreme pins or spikes; the ground that is worked by mine is seven feet six inches broad, so that three turns of mine will do as much work (wanting two inches) as four

four of his, which would be a saving of one day in four, supposing the ground to be equally well worked by both; but that is by no means the case, for in Mr. TREFRY's the tracks made by the pins are at irregular intervals, and the work of some of them totally lost, from their following in the track of those which precede them; which will appear to be the case, if lines are drawn from each pin parallel to the line of draft, as in my plan. Whereas in mine each pin will be found to make a separate track, and the intervals between those tracks will be all equal; so that the entire ground over which the harrow shall pass once will be marked with lines three inches asunder; and as the weight of my harrow is not greater than his, the same horses will work one-fourth more ground in the same time, and do it much better.

Another objection I find to Mr. TREFRY's harrow is, that the posts being at right angles with the line of the draft, when the pins sink into the earth the posts must carry forward all the roots, clods, and stones that it meets; but in mine, the posts being nearly parallel to the line of the draft, those obstructions pass freely between them and under the rails which connect them. And the hinge in mine being in the line of the draft when the harrow is drawn up and down ridges, it accommodates itself better to the shape of the ground; the joint rising when on the top of the ridge, and sinking when it is in the furrow.

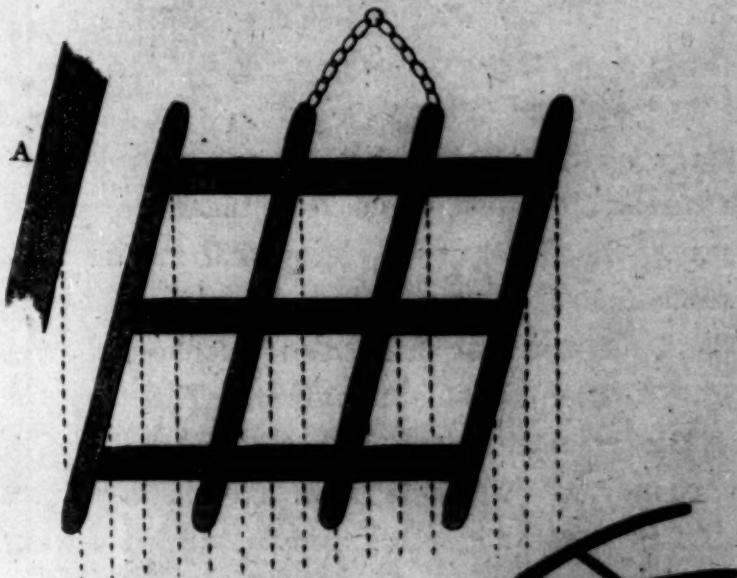
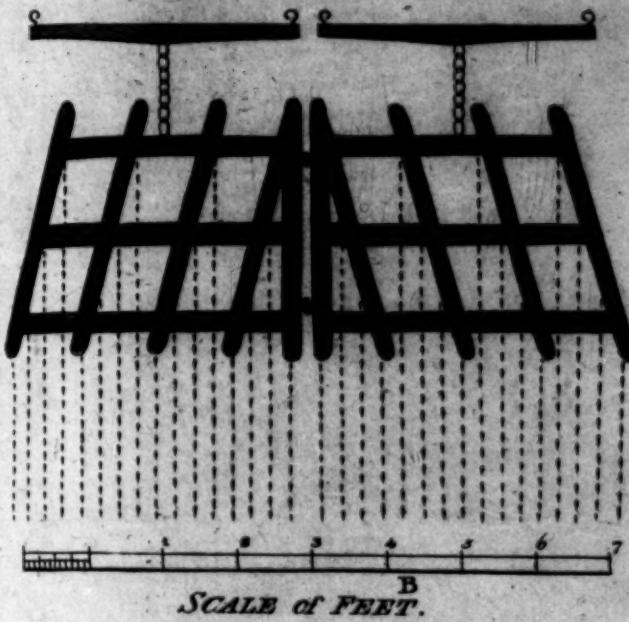
I also

I also send a plan of a Drag, or heavy harrow, which I think simpler and better, without a joint. It will work a piece of ground six feet three inches broad, leaving intervals of five inches between the tracks. This is constructed on the same principle as the other, for the principle is a general and simple one, and is applicable to harrows of any size, or for any purpose; as the intervals between the tracks may be varied at pleasure, still preserving their regularity.

I have sometimes made the spikes in the form of the coulter of a plough; but I find that it answers as well, and is simpler and cheaper, to make them of square iron, pointed and bent forward diagonally; and care must be taken to fix them in the posts in such a manner, as that the line of the track may pass through the angles of the spike, as at A in the plan. I have tried different ways of applying the draft, but have found none answer so well as those represented in the drawings annexed; and I recommend, that in the chain of the heavy harrow the three centre links at B may be made round, in order that the draft-chain may be fixed to whichever of them may, on trial, be found to answer best.

Having found much advantage from the use of this harrow, (which is more effectual in its work than those in common use, from the manner in which the spikes are arranged, and is cheaper from there being fewer of them) I wish to give others an opportunity of trying it, and for that purpose commit

*M. WYNNE'S Harrows and Drag.*



*Plough for underdraining.*



Fig. 1. Plan of the Furrow Roller.



Fig. 2. Profile of the Furrow Roller.

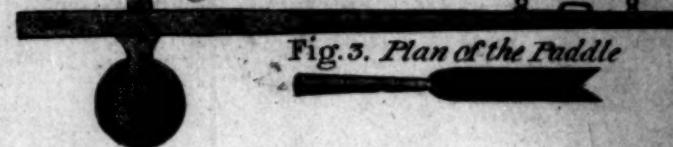
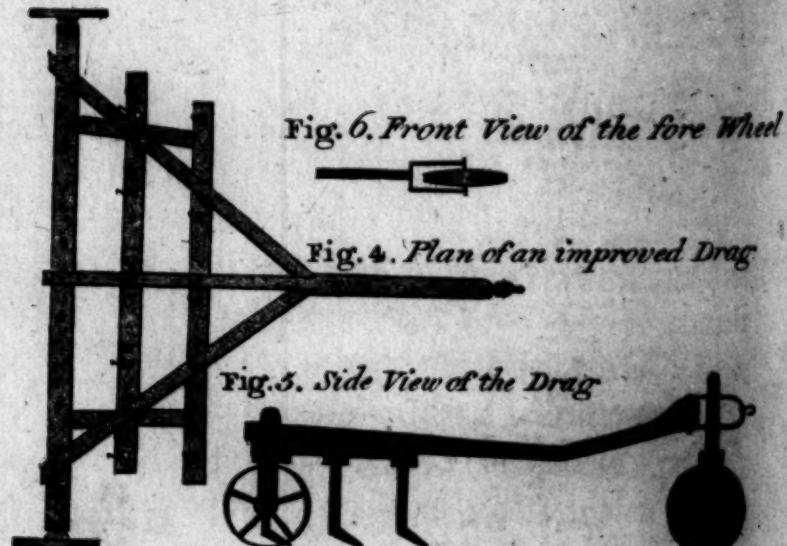


Fig. 3. Plan of the Paddle



it to you, gentlemen, whose object is to make publick whatever may tend to improve the agriculture of your country.

I am, gentlemen,

Your humble servant,

H. WYNNE.

**ART. XVIII.**

*An Account of a FURROW-ROLLER, and new DRAG,  
Models of which were presented to the Society.*

[From Wm. WANSBOROUGH PINCHARD, esq.]

In a Letter to the SECRETARY.

SIR, Stockton, Wilts, Nov. 9, 1798.

ACCORDING to my promise, I have sent you a Model and the Plan of my Furrow-Roller, and beg the favour of you to lay it before the gentlemen of the Bath Agriculture Society, at their next meeting at Hetling-House; and if it should meet their approbation it will give me pleasure.

The whole of the estate I now occupy (the arable) is in common fields, more than half of which lie in computed acres, half acres, quarter acres, and 1-8th part of an acre, (some of the last fort measuring no

more

more than twelve perch) without any boundary between them ; they are measured every time they are sown, and made of equal breadth as acres, half acres, &c. in every furlong. Those lands, being in possession of five or six persons, who sow them at *so many* different times in the same furlong, cannot be rolled across ; of course the furrows are not made plain at all, nor the corn sown in them half covered. Some other part of my property lies in larger pieces by the side of hills, against which the ridges cannot be crossed with the common roller, if drawn by the usual number of horses ; and in going down they do very great damage with their feet, especially if the corn or grass seeds are sprung up above ground.

It is become a custom in the light and hilly lands in Wilts, Hants, and Dorset, to plough the furrows so that the horses may go as level as possible, in which case, as I observed before, it cannot conveniently be crossed by the common roller ; as a remedy for that inconvenience, I thought a short one, to be drawn in the furrow, would answer well in both the above cases. I ordered the one I now have to be made immediately, and am pleased to be able to tell you it answered the purpose better than I could suppose it would ; it is easily drawn with one horse, which, if led by a boy, and the ridges are two perch in breadth, it will roll the furrows of thirty acres of land in one day ; the common roller, being hauled lengthways over all the land, leaves it as smooth as if it had been crooked.

Some

Some few years since I made an alteration in the paddle, (as it is called in this country) for cutting thistles, and other weeds, out of corn, &c. in the spring of the year. It is now frequently used in this neighbourhood, and much approved of, from its not being so liable to slip beside the roots of the weeds as if it had a strait edge; the form of it is a quarter of an octagon, one inch wide when finished.\* The points guarding the cutting part from the flints it retains a pretty good edge to the end of the day; it is as easily ground as the one with a strait edge, by holding the hollow part upwards, and having the stone turned against the edge as the carpenter grinds his axe or chissels. I have sent one of them with a proper length of handle.

I have likewise sent a model and plan of a Drag† upon a new construction, which will stir the land to any depth required; and by being drawn over it only once, does more good than drawing the heavy drag of this country three times, with the same strength of horses; and if, from the lands being very heavy, &c. it be required to have the tines or coulters cut at seven inches and a half, (instead of five inches from each other, as it does when all the tines are in their proper places) you are to put the tines at *a a a a a* into the holes at *b b b b b*, and take out those in the

\* See the Plate.

† A provincial name for a heavy harrow.

fore beam at *cccc*, which will lessen the strength required to draw it before, almost one-third.

As I am not at present well enough to be at the next meeting, if you will be kind enough to say by letter if the gentlemen approved of either of the models sent, you will add to the obligations already conferred by you, on

Your humble servant,

WM. W. PINCHARD.

[N. B. The thanks of the Society were voted to this Gentleman.]

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ART. XIX.

QUERIES proposed by the Board of Agriculture, and mostly answered by Mr. THOS. PARSONS, a Member of this Society.

I. CONCERNING THE EARTH.

1. *WHAT* effect, in your opinion, has the earth, in promoting the growth of plants, and bringing them to perfection?

2. Is it of any farther service, than to keep the plants steady and upright, and to contain at least some part of the nourishment on which they live?

The

The earth is a basis for supporting the plant, and for enabling it to assume and preserve a proper position. And it is the best vehicle for equally distributing to the fibrous roots that quantity of water which the plant requires for its growth; the absorption, by means of the root, being the general mode whereby such growth is promoted. The earth also admits the solar rays, imbibes warmth, and consequently communicates that warmth to the root. It moreover allows the access of air to the root.

3. *Are there not different kinds of soil, which suit different plants?*

Indisputably.

4. *Is there any kind of soil, in which some useful plant might not be produced?*

I believe not; but it often happens, that the plants most congenial to the soil may be comparatively of little use, and very different from the productions desired.

5. *Are there any plants, which will grow perpetually in the same soil; and what are they?*

Timber and fruit-trees, the common herbage of pastures from time immemorial, the natural turf upon downs and sheep-walks. In a few places wheat is said to be perpetuated. *Query.* The peculiarities of the latter soil?

Gardens suffer but little change of soil, constant motion and a small addition of manure effecting every thing.

6. *What*

6. *What reasons do you assign for soils tiring of one species of plant, and yet producing another species vigorously?*

As this circumstance is not general in gardening, I should suppose it to arise from some local circumstances of situation and temperature, or from some defect in the quantity of the soil, or insufficiency of movement. See query 3d.

7. *Of what is a soil deprived, when it is said to be exhausted?*

Of no sensible chemical quality whatever inherent in the soil. Supposing a thin soil to be burn-baked, when first broken up, and by a course of crops to be exhausted, let a good dressing of vegetable ashes be given it, and I should expect it capable of a similar course. The alkaline obtained by the operation at first may be totally lost, but that not being originally in the soil, the soil is, by the crops it bears, reduced to its original state, and may be supplied by a fresh quantity. In various instances, analogy may be preserved, though circumstances may vary; as some lands may require a calcareous, an acidulous, or ammoniacal manure, instead of an alkaline. Adventitious qualities may be communicated, exhausted, and restored, the inherent character remaining.

8. *What do you suppose to be the composition of the most fertile soil?*

True original earth—that produced by a complex putrefaction of animal and vegetable substances.

9. *Do*

9. Do you suppose that a soil, in which there is no calcareous matter, will produce grain or peas in perfection?

Good garden mould, in which there is no perceptible calcareous matter, will produce both in perfection.

10. Whence is it, that calcareous soils are so favourable to the growth of clover?

See query 3d. From a dryness peculiar to calcareous soils. I have often seen the small hop-clover thrive on the tops of walls, where the soil was merely the scraping of roads, or pulverized freestone, and from its form incapable of retaining moisture.

11. Must not soils, in order to be perfect, have the power of retaining a sufficient quantity of moisture?

Most assuredly. Different vegetables, however, require different proportions of moisture, and consequently soils capable of retaining different proportions.

12. What are the best means of giving them that property?

By a due admixture of alkaline substances, if the soil be in sufficient quantity; if not, it should be increased.

13. Are not soils of too porous a quality, such as those which consist almost solely of sand or gravel, in a great measure barren; not only because they hold no water, but also because any manure put on them is soon carried down and lost, before it has had time to operate?

The pores of gravel are too minute to imbibe moisture freely, if at all. Yet, if the stratum be of

considerable

considerable depth, the lower part will retain moisture; thus eringo and samphire often grow in such strata, and heath in inland situations. For cultivation, perhaps, a liberal supply of a viscid loam, approaching to the nature of clay, might be advantageous; a basis thus formed would support the growth of some kinds of vegetables, and their decay would increase and improve the soil.

14. *At what time does the earth seem to be in the best state for receiving the seed of plants? Is it not particularly when the soil seems to smoke? What is that smoke owing to—to the fermentation of the soil, the heat of the sun, or to what other circumstance?*

I have never noticed this ascent of vapour, but when the earth is moist, and exposed to a warm sun. It is desirable to sow when the earth is tolerably dry, and then to have some warm gentle showers.

15. *If earth be buried for some time after it has been exhausted, will it recover, in four or five years, its former fertility?*

16. *May that not be owing to the richness of the manure in the surface being washed down to it?*

17. *What is the effect of exposing such exhausted earth to the sun, or shading it merely from its rays?*

Perhaps the result of chemical analysis, in the different states, would supply the best answer.

18. *Have you found it of service to change the seeds of plants, from one soil or climate to another; and why?*

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\* In Flanders, they are said to prefer flax-seed from Sweden or Russia; and in Sweden and Russia, flax-seed from Flanders.

From the almost universal adoption of the practice, it seems that experience has fully justified it. In the case of exotics that do not arrive to full perfection in an alien climate, it does not seem wonderful—but in the case of naturalized vegetables, I cannot explain it.

19. *What soil is best adapted for nursery ground; and why?*

20. *How many crops will rich garden-ground produce in a year, in the neighbourhood of London?*

21. *What is the best rotation of crops in such ground?*

22. *How many souls will an acre of garden-ground, properly cropt, maintain?*

## II. CONCERNING THE AIR.

1. *What effect has the air in promoting the growth of plants, and bringing them to perfection?*

By checking the too rapid growth, it renders the plant robust and firm; by its motion, it agitates the plant, and thereby contributes to its health, analogous to exercise in animals—carrying off noxious effluvia from the soil, and purifying leaves, and also the perspirable exudation of the plant.

2. *Do you consider pure air to be necessary for that purpose?*

If by *pure air* be meant good atmospherical air, undoubtedly yes.

3. *Will fruit-trees produce fruit in London? Or within what distance from that metropolis, are the different kinds of fruit produced in perfection?*

4. Do you suppose that plants draw the whole, or any part, of their nourishment from air?

I believe, if they receive air into their constitution at all, it is by the root, and that, I think, is probable; yet the organization may, by a kind of natural chemistry, so change its absorbed nourishment, as to render the actual admission of common air doubtful.

5. Do you suppose that the earth, when fallowed, attracts any substance from the air, favourable to vegetation?

In some cases fallows acquire an accumulation of decayed leaves, &c.; in others, they are better pulverized by frost, &c. than by culture; but I suspect they imbibe no substance from the air.

6. Do you suppose that roots, as turnips, potatoes, &c. extract nourishment from the air by their stems or leaves, and hence exhaust the soil less than grain? Or do they fertilize land by the substances they throw off, and leave behind them?

As far as air is a medium for light and humidity, they may; but I think not from the air itself; and the greater proportion of foliage, the more benefit perhaps from light and aqueous vapour; but I am disqualified for explaining how these plants improve the soil, unless by their decayed leaves and stalks.

7. Do you suppose that trees draw any nourishment from the air, by their leaves?

I do not, excepting air as a medium for communicating light, warmth, and humidity.

8. Do

8. Do not young trees thrive better, when their roots are near the surface, and not too deeply buried in the earth? Would they thrive in heaps of stones, which, it is said, has been successfully tried in France?

I believe the affirmative is generally admitted.— Stones are often placed *underneath* a young tree, for the purpose of preventing a tap-root, and obliging it to extend its roots horizontally. Vines flourish amongst stones and rubbish, but I recollect no other tree that does.

9. When you raise plants under glasses, how often are you obliged to admit fresh air?

10. If no fresh air were admitted, would the plants grow languid, or perish?

Yes, certainly. They will indeed grow, but feeble, slender, dilute in colour, and fainter in odour.

11. Do plants thrive as well kept in glasses as in the open air, the temperament being equal?

If the soil and clime are suitable, the open air is preferable; but glasses are used to bring plants forwarder than in the natural ground they would be.

12. Does there seem to be any sympathy or antipathy between plants; or any natural disposition in some plants to thrive when growing near to certain others; and the reverse?\*

I have never observed either vegetable sympathy or antipathy. Nature left to herself will fill up every

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\* It is said, that hops and potatoes do not agree together.

interval, where there exists any basis for the plant. And her genuine offspring will grow any where, and every where, with some exceptions.

13. *Are there plants that grow well under the shade of others?*

That the soil should be shaded, especially in hot weather, I should think proper; but I do not know any plant (we wish to cultivate) that is not injured by the shade of taller plants—more still, I think, by their droppings.

14. *What are the effects of thunder or of lightning, or any change of air thereby occasioned, upon plants?*

I have never noticed any other effect than that of a branch being killed, appearing as if scorched.

15. *What are the effects of sea air, and the saline particles which it contains, upon plants?*

My observation here is very limited, but the trees I have seen are stunted, and the herbage coarse. I have often wished, that plantations were made along the shores of sufficient width for the outward ones to protect the inner ones, and all serving to guard the contiguous land from the immediate operation of the saline breeze.

### III. CONCERNING WATER.

1. *What effect has water in promoting the growth of plants, and bringing them to perfection?*

As I do not at present believe that one particle of salt, oil, or earth, is absorbed from without into the LIV. 10. 10 constitution

constitution of the plant, I consider water and light, but chiefly the former, as constituting its whole nourishment; in aid of which, soil and air and warmth are necessary.

2. *What kinds of water are favourable, and what are injurious, to vegetation?*

In the floating countries the first warm gush from the spring is preferred.—Mineral and metallic waters are injurious.

3. *What has been the effect of watering young or old plants with hard water?*

4. *How often are garden plants obliged to be watered in dry seasons?*

A watering, proportioned to the heat and dryness, is desirable daily.

5. *What is reckoned the fittest time for watering them, and why?—Evening in the summer, and forenoon in winter; the reasons obvious.*

6. *As plants perish if not watered, is it owing to their wanting moisture to supply their sap, or to what other cause?*

I believe to the want of moisture for preserving the circulation. Plants will be injured by a quantity of water greatly overbalancing the expenditure, and more so still by an inadequate supply.

7. *Would not a tree, if exhausted of its sap, perish?*

Yes, and if the circulation be interrupted.

8. *Does the sap flow all the year round, or during what seasons?*

If there be any circulation in the winter, it is exceedingly languid; but it is probable it does exist in some small degree.

9. *Does any water perspire through the bark of the tree, or from the leaves?*

I do not think it does; perhaps we may except the young twigs, the bark of which may admit of absorption and evaporation.

10. *What is the effect of dew upon plants; and to what extent is it favourable to vegetation?*

Perhaps it checks evaporation, favours secretion, and by a grateful coolness invigorates. I have never understood but its utility was universal, unless we except plants not naturalized to our climate.

#### IV. CONCERNING LIGHT AND HEAT.

1. *What are the effects of light and heat, in promoting the growth of plants, and bringing them to perfection?*

Fruits most exposed to the sun are the fullest coloured and the richest flavoured. I conjecture, that light improves or produces colour, and heat the flavour. From the general direction and appearance of trees, and their foliage, I think they are influenced by both; how that influence is exerted, is not easily ascertained.

2. *Do you know of any plants raised totally in dark places? Do they produce flowers or fruit in that situation?*

I have

I have seen a species of moss, like combed wool, in wine-cellars, but know nothing of its flower or fructification.

3. *Is not light necessary to give plants their proper colour and flavour?*

Fruits and flowers demonstrate this.

4. *Does not heat increase saccharine matter in grain, and in that respect bring plants to greater perfection?*

This fact seems to be well established, from a long comparison between cold and hot summers, and the corresponding state of grain and fruit.

5. *In raising plants from leaves, is it not necessary to keep them in the dark, until they take root?*

I know nothing of the mode.

6. *Is it because the heat of the sun would draw up their vegetable juices, or what other reason is assigned?*

Cuttings and slips are covered up, I suppose to secure them from a powerful sun, the motion of the air, and the chill of night; the first would exhaust them, the second would disturb them, and the last would stagnate them, before they could take root.

7. *Do not any seeds, which lie upon the surface of the ground uncovered, perish from the light and heat?*

They will swell, and, perhaps, send out an incessant germ or root; but wanting a proper basis, will exhaust themselves and perish.

8. *If plants are transplanted in hot weather, or in the middle of the day, are they not apt to perish?*

They

They should not be transplanted when languid, to which state very warm weather reduces them; when most vigorous they best bear the shock. Yet in many cases, to answer the gardener's purpose, some check to vegetation is useful—as in cabbage-plants, where an interval may be allowed between taking them and re-planting them, they being by that interruption more disposed to turn in and form a heart, and less disposed to run to seed.

9. *Would it not be better to transplant them in the evening, and if possible, in cloudy weather?*

If the weather be cloudy, I believe any time of the day will do, because they are not debilitated by a fervent sun.

10. *How does the heat of stoves answer, compared with the heat of the sun?*

These are usually combined, and the effect is to expedite the production.

11. *What is the effect of heat from steam, compared to that of fire?*

I know not from experience; but presume there can be no difference, if the degree and distribution be equal, whence it proceeds.

12. *What are the effects of hot walls, in promoting vegetation? and have you ever tried the effect of making fruit-walls black, so as to imbibe more heat during sunshine?*

The fruit always shading the wall immediately behind it, I should not be induced to make the experiment.

13. *What*

13. What is your opinion of a practice in Denmark, by which, to keep back the blossoms of their fruit-trees, they cover them in the spring in the day-time, and expose them at night?

When the object is to retard vegetation, this method may be useful.

14. Have you ever tried the experiment, of plants being shut up in a dark place, with only one hole in it into which the light was admitted, to see whether the plants would bend to the light?

Without an intentional experiment, the fact too often occurs to admit of doubt. A myrtle in a window, if not sometimes turned, will grow on one side, and that side will be towards the light.

15. Have you ever heard, that trees are better nourished on their southern than on their northern side, and that the inner circles are thicker to the southern than to the northern aspect?

Generally, I believe, the southern side of a tree is better conditioned than the other. This circumstance in the annular rings I have never observed; but as the head of a tree generally keeps the stock from the sun, I should not expect to realize the affirmative, but in particular instances.

16. Do plants grow most in the day or the night time?

I can only propose an answer from general observation, having never critically attended to the query. My decided opinion is, that night is the period for increasing

increasing the firmness and rigidity proper for plants, that the hours of light are the time for enlarging the dimensions, and that the growth is in proportion to the continuance of light; other circumstances equal.

V. CONCERNING MANURES,  
OR DEAD ORGANIZED MATTER.

1. *What effect have manures in promoting the growth of plants, and bringing them to perfection?*

When perfectly reduced to pure mould, by applying to the roots a kind of earth free from all indurations easily communicative of the aqueous fluid, and easily admitting the extension of the delicate fibres.—Indurations, I conceive, to be the great evil to be guarded against, with regard to most plants in cultivation.

Recent manure multiplies insects, and poisons the roots. I believe much injury is occasioned by inattention to this circumstance. I have known recent manure check vegetation to my vexation.

2. *What are the effects of the different kinds of manures, of which you have had experience?*

Stable manure, thoroughly rotted, is an addition of fine soft loose earth; vegetable ashes absorb and retain moisture. Sand worked into the soil renders it lighter and hollower, favourable to tap-rooted vegetables. My experience goes no farther.

Calcareous

Calcareous additions may be friendly to plants affecting a dry soil; but I wish for nothing in a garden of a calcareous or vitrified nature.

3. *What is the proper time of applying those manures?*  
Does this query refer to the season of the year, or to the age and state of the plants?

4. *What is the proper mode of application; mixing them with the soil, laying them in drills, or top dressing?*

By trenching-in, if the manure be incompletely rotted, in order that by the next digging it may be in a proper state for an intimate mixture with the soil. Trenching-in is proper also for sowing, some degree of warmth is excited, and it will be thoroughly rotted before the roots can reach it.

5. *Do those manures promote the growth of plants, by making the soil more porous and open for their roots, by exciting a fermentation in the soil, by affording nourishment to the plant itself; or in what manner do they operate?*

The answer must be matter of opinion; and it is my opinion, that animal and vegetable manures are in a proper state for improving the soil *only* when reduced to pure earth, and that they assist vegetation, as in answer to query 1.

6. *In order that manures may be useful, is it not necessary that the soil on which they are laid, should have a considerable degree of tenacity?*

The soil should have sufficient tenacity to detain the manure in its composition; but the particular degree

degree can be determined only by the nature of the article to be grown, some classes requiring more, others less. Tenacity rarely does harm but when it tends to induration, or retains stagnant moisture.

7. *Is it better to mix a great quantity of manures together into a compost, or to lay them on separately?*

Convenience gives the preference to masses of manure, and in large bodies the fermentation advances, and the dissolution of the substances follows much more rapidly.

8. *What is your opinion of composts of manure and earth?*

That it is an excellent practice; but I fear that composts often lose by drainings, and that they are laid on the lands before they have attained perfection.

9. *Do you know of any practices by which the quantity of manure could be increased?*

Neatness in management would increase it, always pulling up and paring off weeds, from ditches, fences, and the sides of the roads; as well as those among the crops, would accumulate a stock of fine mold when rotten. Soot, ashes, offal, urine, and ordure; every thing produced by man and beast should constitute the farmer's treasure.

10. *What manures would you recommend for the different kinds of soil?*

I am incompetent to answer this properly; the subject is copious—and full answers must be the result of much experience, on a great variety of soils.

11. *What*

11. *What are the effects of dung and other manures, upon the taste, flavour, and wholsomeness of vegetables?*

If the dung be completely rotten, the effects will be quickness of growth, succulence, crispness, and delicacy of flavour. Thus cucumbers in a frame are, in these respects, superior to those grown on open beds; and thus the productions of well-manured gardens are superior to those raised in poor land and bleak situations. Medical herbs raised in the latter situations will be preferable to those on better ground, because a slow growth is favourable to the degree of their medical virtue.

I strongly suspect that the application of ill-digested manure to land, is an evil productive of very great injury. Worms and grubs are multiplied thereby—the most noxious vapours are propagated—and, probably, the diseases in our grain crops may originate in this circumstance. I cannot believe that the delicate fibres of a root, making an effort to penetrate a clod of putrifying dung, can escape uninjured. And vegetable diseases, I presume, often commence at the root.

#### VI. CONCERNING CULTURE.

1. *What effects has the culture of the earth on the growth of plants, and bringing them to perfection?*

By frequent motion the internal parts are brought into use, the contexture is dissolved, and the whole mass so comminuted as to favour the growth of the root, and supply it with moisture.

2. *Is*

2. Is not earth, the more it is cultivated and pulverized, proportionally the more favourable to the growth of plants?

The plough, the spade, and the hoe, do by their operation, demonstrate this to be a general fact.

3. Do not young trees, when transplanted, grow better if the soil has been ploughed, or trenched, and thoroughly pulverized?

Most certainly; in a stiff soil, with only a hole dug to admit the tree, the tree is generally slow in its progress, and often stunted and mossy; let the root have liberty to run with ease, and the branches would be better formed, and make greater progress.

4. Is it not better for young trees, that potatoes, turnips, or other vegetables, should be raised amongst them; and how long should that be practised?

Standards in garden-ground are generally more thriving, and more regular bearers than in orchard, where the soil is never stirred.

5. Is the advantage of that practice owing to the freer admission of air or water, to the roots of young trees; or what other benefit can be assigned?

The freer and more frequent supply of air, light, and water, is the compound effect, as I believe. The frequency is of importance, water lying stagnant near the roots is unfavourable; a fresh and frequent supply is desirable. In the height of summer, one wishes for gentle rain in a garden every other day.

6. Is the earth as thoroughly pulverized by ploughing and harrowing, as when dug with the spade?

The previous state of the soil should be known; the expence of digging an old stiff ley would be very great; perhaps, the spade following the plough would be best.

7. What is the difference of expence per acre, in the two modes of cultivation?

I have no actual experience in such a comparison; but have no doubt, the spade would fully compensate the extra expence.

VII. CONCERNING SUBSTANCES IN THE EARTH,  
INJURIOUS TO VEGETATION.

1. Have you found any substances in the earth injurious to vegetation; and of what nature are they?

Excepting a few vegetables, and until reduced to earth, I have found ashes of fossil coal hurtful, the root cankers, and becomes a nidus for worms.

2. Have you discovered any means of preventing the injury to vegetation done by those substances?

3. Is there not an astringency in peat moss, hostile to vegetation? How is that to be corrected?

4. Why do you prefer putting American, and other foreign plants, into peat? And are there any other kinds of plant, as celery, &c. that thrive particularly well in that soil?

5. Are not aluminous and metallic substances in the soil, hostile to vegetation?

6. Have

6. Have you ever experienced any mode of correcting those noxious qualities in the soil?

7. Have you ever tried whether any plants will grow in a soil thus impregnated, in particular, vetches, which it is said will grow in it?

8. Have you ever observed trees, when their roots reach a strata full of aluminous or metallic particles, decay or be arrested in their progress; and what measures ought to be taken when that happens?

### VIII. CONCERNING VERMIN,

#### NOXIOUS TO VEGETATION.

1. What are the kinds of vermin in the soil, which you have found hostile to vegetation?

Worms at the root, the soft snail to the young plant, caterpillars to grown vegetables; and the house-snail, the wasp, and the common fly to fruits, to which add the millepedes, the earwig, and the centipedes.

2. Do you know of any mode of destroying them?

Avoiding recent manure, fresh lime, bottles for wasps and flies, a quick eye, and an active hand, are the best remedies I know. Diligence and cleanliness will do wonders.

3. What are the kinds of insects in the air, which you have found hostile to vegetation?

Insects intended here, are limited usually to particular species, or similar species of plants. In the fly-state they propagate sufficiently, without supposing them to float in the air. The

The bloom of the apple, pear, and cherry, is very often injured, or destroyed, by a small caterpillar at the heart; the egg of which was, I suppose, deposited in the bud, in the preceding year.

4. *Have you discovered any method of preventing their ravages, or destroying them?*

The history of this insect would ascertain the best time for smothering the trees, which is a good practice; the period of laying the egg is the time, were it known.

5. *What, in your opinion, is the cause of the blight, and the means of guarding against it?*

Blight is to me an unintelligible word. Frosts in the spring, at the period when the blossom is quitting the tender forming fruit, often destroy whole crops. The first tender opening leaf-buds are often destroyed in the same manner; a second effort being necessary, the shoots and leaves are very backward, and the tree by the severe check, much injured. Late frosts do more injury to trees than I believe any thing besides. Shrivelled blossoms and leaves form a receptacle for insects, and insects are often charged unjustly with the crime. Frosts are, however, destructive of the insect tribes, but the larva of insects lodged securely by the parent, are not easily injured until they come into motion, when the small birds make great havock amongst them.

Early blights mean, I think, the depredation of worms, or rather caterpillars, in the buds, or the effects

effects of frosts. In the following parts of the year, the term blight is applied to the ravages of other caterpillars, sometimes stripping off the leaves of a whole tree, or leaving nothing but the rigid fibres; and sometimes it is applied to the too copious perspiration of a tree, the effect of a sudden and intense sun; in which case, the plant is covered over with a saccharine viscid mucilage—of this treacly substance a great number of insects are fond. But it is owing, I believe, to a general rupture of the vessels, and so exhausts the plants as sometimes to kill them.

Did the disease originate in the air, or were insects brought by the air, we should expect the contiguous trees, shrubs, &c. alike affected; but this is not the fact. The leaves of lime trees are constitutionally subject to this saccharine exudation, without any sensible injury.

6. *Are bees favourable or otherwise, to the growth of those plants, from the flowers of which they extract their honey?*

7. *What seasons are supposed to be the most favourable for the production of the different kinds of insects? And are there any precautions that can be taken against them?*

Early summers give them an opportunity of multiplying their generations.

8. *Are there any plants, or shrubs, the smell of which is destructive to insects?*

Elder,

Elder, though preyed on itself by some insects, is, I believe, injurious to others. Tobacco applied in powder is useful; and the tobacco plant I have never seen attacked by any. But sublimate (as in the medicated tar) is the most efficacious, where it can be used with safety.

9. *Have the foreign plants brought into this country, introduced any insects peculiar to themselves; and have they afterwards become injurious to any of our native plants?*

10. *Have you ever tried fumigating or other instruments, for destroying insects; and how have they answered?*\*

General practice induces us to conclude, that the smothering of trees by burning weeds is beneficial, by suffocating insects.

11. *Have you ever tried, whether water mixed with coal-tar, will destroy insects either in the ground or on plants?*†

\* Instruments of that sort, have been brought to considerable perfection by LLOYD, tinman, No. 178, Strand, London.

† A respectable naval officer has found it to answer completely, both in England and in the West-Indies. He puts some tar in a barrel, fills it with water, stirs it well about, and in a few hours it will be fit for use. It effectually destroys that kind of vermin which attack gooseberry trees, and by merely watering the ground, it kills worms, grubs, &c. at a considerable depth under the surface. It might be worth while to try it on grass ground injured by worms, ants, &c.

This, from its ease and simplicity, promises well, and deserves the fullest trial.

12. In what respects are moles injurious to vegetation; and what are the best means of destroying them?

IX. ON THE IMPROVEMENT OF PLANTS,  
BY INTRODUCING NEW VARIETIES.

The following queries, with regard to the improvement of plants, by introducing varieties, through the medium of cultivation, drawn up by an intelligent friend to agriculture, are also particularly recommended to the attention of the reader.

1. Are there any means of increasing the quantity of seeds, in the several particular species of plants, so as to render them more numerous? And if there are, what are they?

2. Are there any means of increasing the size of the cotyledons of plants, so as to make them contain a larger quantity of saccharine, or farinaceous matter, whether they be covered only with membranes, as in the gramina, or likewise with an additional hard covering, as in nuts?

3. Are there any means of increasing the saccharine matter in fruits?

4. Are there any means of increasing the size of fruits, without rendering them more watery?

5. Are there any means of increasing the flavour of fruits?

I am not qualified to give specific answers to these queries; generally, however, a pure healthy soil will produce pure and healthy vegetables, and vegetables

tables so characterized will supply the most perfect fruit and seed. Those methods, therefore, which contribute to accomplish the first object, will (allowing for difference of season) secure the ultimate object. Imperfect manures, partially putrified, often do injury to the first crop. A super-abundance of water, as in water-meadow, will generally increase the product greatly; but it is doubtful if the product be so replete with saccharine nourishment as in other cases. A depth of soil is very desirable in almost all cases, especially where a large, and particularly a long root is wanted. And, it is my opinion, that the advantage arising from some manures is principally owing to an increase of the soil.

An enlargement of fruit, of the same kind, will generally be attended with a loss of flavour, or the same quantity of flavour will be diffused through a larger space, and therefore appear weaker, or more diluted. As in golden-pippins, apricots, &c.

6. Since the flowers of several plants are used in dying, such as the carthamus; or in medicine, such as the crocus, what are the methods of rendering plants more prolific in flowers, or of increasing the number of flower leaves, or parts used for dying, or in medicine?

Shade and too much moisture are discouraging to bloom. When in bloom, plants expend fast, and need liberal supplies; but a soil rather dry is best for multiplying the blossoms.

7. *Are there any means of increasing the herbaceous matter in a plant, so as to make the quantity of it greater, as in cabbages?*

The best method I presume, is, by employing good land, frequent hoeing, and allowing ample room.

8. *Are there any means of rendering the herbaceous parts of a more saccharine, or otherwise nutritive quality, so as feed a greater number of animals, or to render one animal far more quickly?*

By preferring health and vigour to luxuriance.

9. *Are there any means of producing a larger quantity of root, whether tap or tuberose?*

By ascertaining the due distance, which experience must determine; other circumstances coexisting equal.

10. *Are there any means of rendering any tap or tuberose root of a more nutritive quality, so as to feed a greater number of animals, or to render one animal fat more quickly?*

By preventing the accession of more water to the roots than is necessary.



## ART. XX.

*An Account of Enquiries, respecting the subject  
of POPULATION.*

[By Sir JOHN CALL, bart. M.P.]

In a Letter to the SECRETARY.

SIR,

Whiteford-House, Callington,

June 21, 1798.

HAVING lately communicated to the Board of Agriculture in London, (of which I have the honour to be an ordinary member) an abstract of the baptisms and burials of twenty-eight neighbouring parishes in Devon and Cornwall, it has occurred to me, that a copy of the said abstract, with some observations and conclusions, which I have drawn therefrom, as matter of opinion, would not be unacceptable to the Bath Society, who have shewn so much zeal to promote the agriculture of this kingdom. I have, therefore, to request, that you will lay the papers, which I now transmit you, before that Society, at their first meeting; and if any doubt should remain of the actual increase of population, it will be easy for any member to satisfy himself of the fact, by the same means which I have pursued, viz. by sending to the minister of any parish, where he can take

take the liberty, a prepared paper similar to that which I inclose.      XX. TIA.

It is probable, that in large manufacturing towns, where people are drawn together, and employed in the manufacture, many are buried who are not born there; although I have not found it to be the case in Launceston, Tavistock, or Liskeard. On the other hand, I have only obtained returns of the baptisms from the clergymen of the established church; but am informed, that the dissenters, and other sectaries, baptize in their own houses or chapels, notwithstanding they bury in the publick church-yard. Consequently the population may have been increased more than appears by the abstract which I have collected.

Since the beginning of last month, I have written to friends and correspondents in many other counties of Great-Britain, and sent them prepared papers, requesting they would get them filled up in as many parishes as might be convenient. I have already received several returns, and find the increase of baptisms prevails in all, especially in country parishes, inhabited chiefly by farmers, mechanics, and labourers.

When I have compleated this farther enquiry, I shall take the liberty to communicate the result to the Bath Society, that the collection may remain among their records; and I shall be happy, if by any labour or suggestion of mine, I can establish the necessity, and promote the means of meeting and providing

providing for an increased population, by an adequate supply of butchers' meat and bread-corn, at a reasonable rate.

I am, sir, with esteem,  
Your very obedient servant,

J. CALL.

*To the Secretary of  
the Bath Agriculture Society.*

*To the Society for promoting Agriculture, at Bath.*

MY LORDS AND GENTLEMEN,

THE scarcity of grain which prevailed throughout Great-Britain in the year 1795, not only created great distress, by more than doubling the usual price, but threatened a succeeding famine. Circumstances so alarming, induced your laudable Society, among many others, seriously to enquire into, and suggest every possible means of internal resources, to alleviate the existing calamity, and to point out, if possible, the certain grounds of preventing the like in future. Butchers' meat being at the same time greatly increased in its price, was another object of investigation, not only by your Society, but by the Board of Agriculture in London; and by every other promoter of agriculture, and well-wisher to the prosperity of this kingdom.

Independent

Independent of the destruction of cattle by the hard frost in 1794, and the succeeding deficient crops of corn, as well as the additional consumption by Emigrants, French prisoners, and the extra provisions requisite for the land and sea forces, many persons, curious in their enquiries, thought there were radical causes, which occasioned greater annual consumption both of bread-corn and butcher's meat; more especially as an increased importation of the one (instead of exportation) had taken place since the year 1774; and the price of the other had been increasing since the year 1782.

These circumstances, notwithstanding the general and particular excitements to an improved system of agriculture, and the evident improvements which had taken place, stamped on my mind a persuasion, that an increased and increasing population was the progressive and radical cause of the increased price, in consequence of an increased consumption. I therefore resolved to take the first opportunity of ascertaining, by incontrovertible evidence, the actual state of population during the course of ten years, within a small district round my residence in Cornwall. For this purpose, I wrote to the several ministers of twenty-eight surrounding parishes, requesting they would indulge me with correct extracts from their respective registers, of baptisms and burials from the 1st of January, 1788, to the 31st of December, 1797. A correct abstract of those returns  
accompanies

accompanies these reflections, with a short note as to the extent or nature of each parish, composing the list.

Besides the reasons before stated, which induced me to believe that the population of the country was greatly increased, I was further led to adopt that idea by the great demand for fire-wood; the scarcity of which was every where complained of, in Cornwall and Devon, notwithstanding the encouragement to promote the growth, by a doubled price; and notwithstanding the introduction of grates, and burning pit coals in almost every town, and among the higher classes of people in every parish within ten miles of the sea coast, (where coals were never seen forty years ago) yet such was the actual scarcity of furze and faggot wood, that it could only be reasonably accounted for by an increased population, and by a greater number of fires being daily kept up.

Those who are curious to make a general or particular comparison between the number of males and females baptised, or buried, in the several parishes, or to draw any conclusions from them, may do it by reference to the abstract. I shall only observe, that most of the parishes are inhabited by farmers, labourers, and mechanicks, dispersed in separate houses, and, in general, on very small farms. There are only four towns, of no great magnitude, in the twenty-eight parishes; and although it may be supposed, that in the course of the last five years,

the

the burials may have diminished, by deaths in the army and navy during the war; it did not strike me, on a strict examination of the several annual returns, that there was any difference worth notice between the burials of males in the first and last five years; and the excess, upon the whole, is only 109 males more than females buried, or about 1 male in 11 of the whole increase.

Having thus stated the fact of increased population, I beg leave to add the grounds on which it appears to me to have taken place, in the several parishes composing the abstract, and probably has produced a similar increase throughout the kingdom.

First, the introduction of inoculation, which began to be much practised about forty years since, and now generally prevails through all ranks, at all seasons of the year; and as great numbers of lives have doubtless been progressively preserved from the fatal effects of the small-pox; even those who were infants thirty years since, have for ten years past been adding new births to the population; and it may be expected, that a greater increase will take place in the next, than has happened the preceding ten years, from the same cause. In addition to this great source, I can state with certainty, as a second cause, that within the parishes here noted, a great change has taken place within these twenty years past, with respect to the manner of hiring and employing farm servants. In former times, the plough-

boys

men

men and other labourers, were hired servants by the year, living in the houses, and eating with their masters, and their wages were from four to six pounds, according to their characters, strength, and abilities. By degrees the mode of executing farm labour was greatly altered; the labourers married, lived to themselves, and worked by the day, at the rate of 5s. per week from Michaelmas to Lady-Day, and 6s. from Lady-Day to Michaelmas. Within these ten years, the price of labour has been increased 1s. per day, throughout the year; and within these three or four years to 14d. besides a supply of grain from their employers, under the market price. But there is not above one-third of the labourers now kept as yearly servants, in the houses with the farmers, to what there were twenty years ago; and I believe, there are three times the number of labourers now married (many of whom have numerous families) that there were at the above period. While the men were yearly servants with the farmers they could not marry; at present they certainly add much to the population, and by having separate houses to the consumption of fuel. The poor-rate is also greatly increased by this separation, for most of the labourers' children are supported and bound out by the parish; and farmers houses, who rent or occupy of their own above 20l. per annum, are filled with such apprentices of both sexes, where, in general, they are better fed and taken care of than they could

have

have been with their parents; and consequently, when they attain the age of twenty-one, are free to go and marry, all which is another source of increase to the population.

That I may endeavour to place the necessity of an adequate and early provision of bread in a stronger point of view, I will suppose, that from the year 1770 to the year 1788, the population of Great-Britain had increased from eight to nine millions of souls, and from that period to the end of the year 1797, a farther increase of one million had taken place. In this latter Supposition I am in a great degree warranted, by the abstract which accompanies this paper; whereby it appears, that in twenty-eight parishes, containing, as far as I can collect, nearly 24,000 inhabitants, the increase in ten years has been 2311, or about 1-10th part. For the sake of round numbers in calculation, I will assume, that the population of Great-Britain at present amounts to ten millions, and that every man, woman, and child of that number consumes of bread-corn six Winchester bushels per annum; and that on an average, the produce per acre is not above twenty bushels, fit for conversion into meal or flour for the subsistence of mankind. What may be farther requisite for breweries, distilleries, starch, powder, &c. or feeding of animals, I will not here touch on, but confine myself to the object of population.

These calculations add to the last

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By

By a table of imported and exported grain, hung up in the Treasury Chambers, it appears, that to a certain period, (which, as far as I can recollect from memory, is to the year 1774) England had received a balance of about four millions sterling, or about 400,000l. per annum, in the latter years of that period. After this, the exports began to decline, and the imports soon gained an excess, till they amounted in these two or three last years, to about 7 or 800,000l. annually; so that, supposing two-thirds of the value of the grain imported to have been wheat, worth at least 5s. per Winchester bushel, the annual importation of late has been 3,200,000 bushels, equal to the produce of 150,000 acres of land, and to the subsistence of 533,333 people.

The progressive increase of population, according to my ideas, actually demanded such a supply of bread-corn from abroad, unless the produce of the land has been progressively increased by improvements in agriculture, or that an adequate number of acres of waste land has been brought into cultivation. The fact is, I apprehend, that these circumstances united, have not been sufficient to provide for an increased consumption; and although a great number of Inclosure Bills have been passed within these twenty years, yet they have been chiefly of common field land; and I fear by this mode, that more has been converted to pasture than has been preserved to arable. But taking the preceding data and facts

as

as they are, and as they stand incontrovertibly, it is clearly deducible, that Great-Britain must either continue to import a considerable portion of the first article of subsistence, and thereby give an annual bounty to foreign cultivation, or that 160,000 additional acres of land must forthwith be brought into tillage; and 30,000 added yearly to that number, to provide for an annual increase of 100,000 souls in the population. Without such a resource, starvation or emigration must ensue; for I will not suppose any legal or political stop will be put to the increase of mankind.

It then becomes a question seriously to be decided, whether Great-Britain, as a commercial island, depending greatly on the cheapness and excellence of her manufactures, for the support and extension of her commerce, and of course the maintenance of her power, should depend in a great degree on foreign nations for her daily bread. If that important point is unanimously decided in the negative, the argument for bringing every inch of waste, or unproductive land, into an immediate state of inclosure and improvement, is supported by imperious necessity; and it will become a duty, in the highest degree incumbent on the legislature, to meet and provide for this growing demand.

I could enlarge much on this subject, which I have greatly at heart, but a state of total blindness, and other infirmities, under which I labour, is rather

rather inconvenient for calculations and literary discussions. I therefore hope, that others, who are impressed with the same ideas which I feel, and have more facility of communication, will pursue the subject, until it is thoroughly established and provided for.

I have the honour to be,

My Lords and Gentlemen,

Your faithful humble servant,

J. CALL.

Whiteford-House, Callington,

June 21st, 1798.

Extract of a letter

[~~12~~ The foregoing subject has been deemed so important, and the manner of treating it by the worthy baronet so interesting, that the Committee had particular pleasure in adopting the paper for the press. If the result of Sir JOHN's very attentive examination and reasoning be applicable to the whole kingdom, no small degree of useful alarm should take place; and in order that a more complete knowledge of facts may be obtained, under experience of the present high prices of provisions, it is desirable that other country gentlemen should take some similar method of investigation *in due time*. To aid which, Sir JOHN's *form* is annexed, for collecting uniform information.]

An

*An Abstract of the Baptisms and Burials, in the Parish of*  
*of December, 1797, as extracted from the Parish Register, by*  
*in the County*  
*1788, to 31st*  
*June 1798.*

Date.	BAPTIZED.			BURIED.		
	Male.	Females.	Total.	Male.	Females.	Total.
1788						
1789						
1790						
1791						
1792						
1793						
1794						
1795						
1796						
1797						

**Excess of Baptisms, (or Burials.)**

## ART. XXI.

*An Account of the peculiar Nature, Use, and Value of the TURNIP-ROOTED CABBAGE, with the best mode of its Cultivation; founded on long experience.*

Addressed to the SECRETARY.

[By Mr. LEWIN TUGWELL.]

DEAR SIR, *Leighterton, May 13, 1799.*

HAVING for a series of years had the plant, the subject of the inclosed memoir, and some others, under experiment, for the purpose of establishing a succession not liable to failure, during and after the season wherein the common turnip is usually injured by frost, I have, at your request, and thinking it a duty incumbent at this particular juncture, given the following for the information of such sheep-masters as have not yet been acquainted with the subject; and who, having shared in the late general loss of lambs, &c. will, probably, from retrospection, be more disposed to confer on it some degree of attention.

I am, dear sir,

Very sincerely your's,

L. TUGWELL.

WHATEVER, comparatively with respect to other nations, may justly be said in praise of the British isles, in regard of the many necessities, comforts, and enjoyments of life they afford; it must be acknowledged, that the weather here is for the most part extremely variable and inconstant, and that our seasons are altogether uncertain; and from thence not easily to be provided for. From these facts, reasoning in the abstract, we might be led to apprehend, in a correspondent degree, famine, sickness, &c. Happily this is not the case; and we have every reason to thank, and with gratitude to adore, the great Dispenser of all things for every enjoyment human wants may call for—every gratification a rational and discerning mind can wish. While surrounding nations are almost every where embroiled, and their entrails torn by internal dissentions, or general devastation, Britain, surrounded by her navies, sits composedly in the midst of them, and, from the excellence of her constitution, superior spirit and genius of her sons, and abundant produce of her well-cultivated soil, gives laws, relief, or sustenance to them all. The encouragement derived to our agriculture, arts, manufactures, and commerce, and *a view to the protected enjoyment of their thus acquired productions*, calls forth an energy in the human mind obviously by no other means to be excited; and stimulates it to all useful attempts, in a way never to be equalled without such incentive.

The

The great perfection and extent to which our commerce has recently attained, have led some to conclude, that it is in fact approaching to its summit; and that it must from thence experience a degradation and *fall*. This, however, it must be allowed, would be reckoning without our host, and reasoning from no other data than what is on record of the fate of other antecedent states, that may have been in some circumstances, *not necessarily involving such a conclusion*, similar to our own. So far are improvements in such of the arts, as are allowed to be requisite to human support, from being under a necessity of involving, and thence, as probably, approximating to, a *ne-plus-ultra*, that it may for the most part be observed, that one discovery therein only serves to afford a view of, and thence to lead to, the attainment of another; and as the possession of a super-abundance of certain necessaries in life awakens a sense of, and, in like manner, by a chain of causes and events, leads to the attainment of all others; the desirable, and, under Divine Providence, very certain result of such general abundance, will be an increase of population, and of which the experience of some few past years has afforded us very ample proof. And hence, (as, by a very expressive metaphor, was said of the late Marquis DE TURBILLY, who, by the most masterly improvements over his very extensive domains, gave birth to 20,000 labourers and occupiers thereon) the improvement of

the useful arts will figuratively, and in effect, be only *sowing men*, and propagating the human species; and while (notwithstanding we have so long been fruitlessly colonizing in distant countries) we have within our own domestick bounds, perhaps many more than ten millions of acres yet unploughed, and that, by proper encouragement, those already under aration may be rendered abundantly more productive; we have surely much yet to do in the *sowing way*, and (luxury and moral corruption apart) but little to apprehend from a diminution of trade.

However, without recurring to an enlarged population, as a call for improvement in the arts, it must at this day afford serious matter for regret, that in our agricultural departments, after these twenty or thirty years' regular and progressive improvements in our cattle and sheep, during which, so ardent have been our pursuits after excellence in their respective breeds, that it has ceased to be matter of wonder for our horned cattle to have been purchased at 2, 3, or 400 guineas a-head; and that for the use, for a single season, of one, two, or three rams, should be given to an individual proprietor 400 guineas a-piece; that after the well-directed attention of our modern cincinnati, and the truly laudable and successful efforts of many of our first nobility, in attaining and promulgating the art of diverting the nutriment of the food, taken in by our

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\* Alluding to America. quadrupeds,

quadrupeds, from the unprofitable to their more useful parts; I say, after these, and the many other methods called in for acquiring and diffusing useful knowledge through almost every ramification of the art, it is matter of serious regret, as well as for curious contemplation, that we are in these islands, at this enlightened period, without the practice of any general definitive means of securing food for our nicely-selected and justly-esteemed animals (at all other times highly pampered) at least for the term of one month in almost every revolving twelve; so that although nothing unexpected or unforeseen should happen with respect to season, the effects generally militate strongly against all our attempts at improvement, however costly, during the other eleven; and in case of a little extraordinary severity therein, they are often disastrous and fatal to an almost incalculable amount.

In your neighbour CRUTTWELL's paper of the present day, (May 9th) we have the following melancholy accounts:—“ The loss among the sheep, “ through the severity of the season, has been im- “ mensely great in various parts of Cumberland and “ Westmoreland. Only 30 are stated to have been “ saved out of a flock of 300; 300 to have been lost “ off one farm, containing about 1000; and 500 to “ have suffered out of a flock of 800.” And further again, in the same, “ All the hay and straw in most “ counties have been nearly consumed, in support of  
the

“ the cattle, without the probability of any grass at  
 “ May-day to receive them. Young ewes of all the  
 “ principal flocks, which lambed down late, will not  
 “ rear half their produce,” &c. &c.—Even in the  
 neighbourhood where the writer of this resides, are  
 many instances almost equally calamitous.

A collector of mort skins (*i. e.* of those of sheep having died of hunger, disease, &c.) bought, a few days since, of a neighbouring farmer, whose flock before amounted to only 240 sheep, 60 skins at a purchase. Another, with a flock of 100 ewes, has already only 30 lambs left. A third, we are told, had sometime since 160 ewes without lambs, and that he had 20 of the latter died in a night; and that a fourth, has at this time 200 ewes without lambs. Fortunately, we had almost every where a double stock of hay in hand; otherwise the general disaster must have been still more dreadful. This, however, it must be allowed, arose from no extraordinary foresight or œconomy of our own; and as it is now nearly consumed, should the inclemency of the ensuing winter be equal to that of the one now past, the severity of its effects must be every where felt to an extent not easy to appreciate, or (advanced as the year now is) provide against.

It is generally supposed, that since the introduction of turnips to these islands, the numbers of our sheep must have greatly increased, and perhaps progressively, as the cultivation of the former has  
 continued

continued further to extend; while their qualities, even under immediate observation, have, perhaps, more than proportionably amended. And at this time to suppose that, in our present routine of management, nothing may be found in the vegetable world for supplying the glaring deficiency, which is the subject of this paper, would probably be much more preposterous than, after the first instance of the growth of turnips, to have disregarded a report of a green vegetable food having been discovered in them, competent to the support of the then sheep-flocks through the dead of winter, nearly equal to that of grass in summer. However, it being now known and acknowledged, wherever the culture of these has prevailed, that until they become too much frost-bitten, they afford a most nutritive food, and competent to every requisite purpose; we have surely much greater reason for encountering any difficulty or expence in surmounting our inconveniences, than our predecessors; they having had annually a dead six or seven months to contend with, during which no artificial support could be found for their flocks, but in the very expensive article of hay; and of which the quantities they raised, from their artificial grasses, could be in no wise equal to what we now command from our improved culture, of which that of turnips is the basis; while we, getting, for the most part, smoothly and comfortably through the winter season, have only a month or six weeks

weeks wherein we have absolute cause of complaint. However, although they are of much shorter duration, the severity of our sufferings, during their continuance, is what they could comparatively have had no idea of; as our flocks, amply provided for through the greatest part of the year, are in consequence more numerous. As they are, from an enlarged frame and refined properties, individually, of much more value, and having, in great measure, attained their comparative excellence from such pampering and fostering, are much more susceptible of injury from abstinence than were the hardy rabbit-like animals of many of our ancestors; depastured, during summer, chiefly on commons or common-field lands, and through the winter months subsisting, in no small degree, on the roots and filth of their fallowed fields.

As, from state exigences, we begin to be individually called on for greater attention and energy than heretofore, it is full time to acquire and employ them; and to discern and acknowledge that the all-bountiful Author of Nature, if we keep our minds open to conviction, has not been more sparing of his gifts, generally speaking, at or for the consumption of one season of the year than another; and with respect to a supply for the above-stated deficiency, if we attentively seek it, we shall not have far to travel; it will be found at our doors.

In the *Turnip-rooted Cabbage*, originally from Lapland, will be found a remedy for all our grievances, a general

a general panacea for all our complaints! However, to suppose this, or any other matter for the purpose, may be obtained, without duly attending to their nature and properties, would surely be as absurd as to expect the same of any other plant (nearly all originally of foreign extraction) we have condescended to adopt, and have now under culture; and accordingly, and with as rational views of success, might our turnips, barlies, &c. be sown at Michaelmas, and our wheats at the beginning of April; as to treat the plant in question, both with regard to its culture and expenditure, in the way frequently done, and of which the writer has too often been a disgusted eye-witness.

Although facts would always speak for themselves, and the turnip-rooted cabbage, properly treated, has always been found competent to every necessary purpose, (the writer having, after twenty years uninterrupted experience, never found a fair practitioner hardy enough to assert the contrary;) and although he dares take upon himself to assert, that there is not an article in the whole range of plants, cultivated for the support of farming stock, (its field room considered) of equal importance; yet, too true it is, that hitherto it has been mostly considered as an off-scouring article—a matter to be attended to only when nothing else can be found for employment. Thus, a similar tardiness and remissness having prevailed, we have it on record, that the common tur-

nip,

nip, after its first introduction, was cultivated with success for upwards of thirty years together on a particular farm, before it crept over the hedge to the next;\* while the potatoe, for culinary and other purposes, it is well known has, at intervals, shared a similar or worse fate. Happily the value of the former is at length more justly appreciated; and the latter, being found a delicacy at the tables of the rich, and having several times, and once about four years since, been called in as an effectual preventative of famine, affording a competent support for our poor, when no other thing was to be obtained; we are now, with all the cares attending it, tolerably well reconciled to.

In opposition to the too prevalent inattention above-described, there are many reasons that should direct a sheep-master, on an improved upland tillage farm, to leave even his fine field of hay for an opportunity of putting in seasonably his turnip-rooted cabbage.

His increased crops of hay, grass, vetches, turnips, &c. enabling him to sustain, at all other times, through the year, an enlarged stock of animals, not only procured with great care and expence, but whose frames having also been greatly extended from an ample supply of these edibles, will become, as before observed, the more susceptible of injury from a temporary discontinuance of them. Being driven

to the pinch, rather than sustain such injury, (from a temporary scarcity of probably not more than six weeks, from about the middle of April to the latter end of May, and which is generally experienced once in four or five years, and of late more frequently) he will feed down his natural grasses, otherwise allotted for the scythe only; rather than depreciate a stock he may have been some years raising to an high pitch of excellence, he will turn them in on his clovers, ray, and other artificial grasses, all procured at great expence; but which, on difficult upland farms, should a dry season succeed, even in the partial degree often experienced, will be of comparatively little value. Whereby not only the quantity of summer food in grass, necessary to the maintenance of an appropriated stock, but that also intended as hay for their winter support, will be greatly depreciated and lessened; while his wheat after clover, and barley after turnips, will both be involved in the consequences, and in a similiar proportion be disparaged and lessened also. During such distress, he will not deem even his now growing fine field of early-sown wheat as sacred, and unapproachable; although he knows that, on shallow soils, nothing can be more injurious than feeding it in the early spring months.

While he contemplates the mal-influence of the above encroachments extending itself to the minutest ramification of his arrangements, and sapping the foundation of his projects for future enlarged crops,

by

by lessening the bulk of materials intended for future composts, in the straw, haulm, and refuse of the dis-  
paraged crops here enumerated; all these, and  
other sacrifices, will he make, rather than nip his fine  
flock in the bud, by stinting his lambs, and thus  
checking them in their approach to perfection. And  
although these descriptions may with some be thought  
exaggerated, or at least stretched to their utmost ex-  
tent, yet, for the verity of them all, the writer dares  
appeal to the ancient veteran upland farmer, (with  
some such he has long been in habits of intimacy)  
grown wise from experience, and impartial from  
conviction; for after all that can have been done to  
prevent it, if the severity of the season should be of  
an extraordinary continuance, (as in the instance of  
the present year) the much-dreaded embarrassment,  
the well-parried evil, will finally get footing, and  
subvert the whole of his schemes and his intentions.  
His fine ewes, after having given their lambs through  
their nipples almost the whole of their carcases, will  
lose the whole, or greatest part, of their milk; the  
lambs themselves will become weaned, stunted, and  
deranged in their size, beauty, and growth; his young  
sheep will be tucked up, their bellies almost to their  
backs; and on the contingent return of warm and  
moist weather, much loss will accrue from blood, flux,  
&c. and numerous deaths and disasters will ensue;  
and although they will, many of them, escape imme-  
diate mortality, even their after-shorn fleeces, much  
lessened

lessened in quantity, and materially injured in their properties, will point back to the sufferings the animals have undergone; while, in their constitutions, will have been left the seeds of many disorders of the lungs, the brain, and the skin, seldom at their consummation, ascribed to their proper and original source.

To attempt investigating the causes why the turnip-rooted cabbage has not, in our present improved systems of culture, made a further progress, would be entering on a field too large for this memoir. They are many, and some of them obvious; but withal (however mysterious) so formidable, as probably not to be removed, or shaken, by any thing that could be said in it; and may, perhaps, sometime in future be thought a fit subject of enquiry with the Board of Agriculture.

Those *usually urged* are, first, That the toughness of its coat occasions, to sheep fed on it, a premature loss of their teeth;—fortunately, against this, assertion only can be brought. The writer, during more than twenty years uninterrupted experience, wherein he annually fed from 3 to 700 sheep, does not recollect more than one instance where he believes the loss of a tooth was fairly imputable thereto. It was, however, always a law with him, prior to feeding, to pull up the roots, and *divide* them in a manner that will be hereafter described.

Secondly, It has been said, that its fanged roots, carrying much dirt, are found difficult to be consumed,

sumed, and are frequently left an incumbrance on the soil; this, among many others, is a proof of how little knowledge of the specific and valuable properties of this plant has hitherto been acquired. It is generally known, where the plant has been cultivated, that its roots are fanged, and numerous; while few, it seems, are aware, that these fangs are equally sweet and nutritious with the bulb itself; and that the sheep left to select them, when treated as hereafter described, will all be seen well doing while there is an untouched fang to be found. If at the end of the season a quantity of roots are left an incumbrance, it only proves that the sheep fed thereon had, by so much, more given them than they wanted; and that more stock should have been brought on the field.

After experiencing for awhile many of the aforementioned disasters, the writer, early in life, set himself earnestly about discovering that great desideratum—a spring-feed for sheep; and after trying every plant that appeared to stand forward for pre-eminence in the case, viz. Scotch Drum-head Cabbage, large Red Cabbage, American Sugar-Loaf Cabbage, *Turnip Cabbage*, Borecole, Black Brocolia, Choux-de-Milan, &c. &c. found them all appropriately useful; but neither, in any wise, to come in competition with the turnip-rooted cabbage, for the purpose above-mentioned, namely, a permanent and stable support for sheep in severe seasons, and critical situations,

situations, when and where *no other* virid food can be relied on; and even that expensive article hay will frequently, in dry weather, become disgusting to them. Then it is that *these* may be had recourse to, and depended on, for lifting our sheep flocks in a respectable way to grass; then it is that these, as a dernier resort, will be found adequate to every useful purpose; while, in the mean time, their peculiar properties, as under-mentioned, seem pointedly to indicate them the appropriate and good gift of Providence, as a resource for so critical, so contingent, so distressing an interval.

In taste and consistence much resembling the kernel of the cocoa-nut, their juices are more oily and less succulent than those of any other root employed for agricultural purposes; and are, probably, in a similar degree, more nutritive than any. They not only *in this* appear appropriate to the particular season, but, if given to sheep sooner in the winter, will be found *comparatively useless, frequently injurious, and sometimes deleterious*. While a few warm days will, early in the spring, set the juices of all other vegetables in motion, as preparatory *only to future supplies*, those of the turnip-rooted cabbage, retaining their original Lapland habits, remain invincibly dormant, motionless, and as it were, reserved for our intervening use and relief.

About the middle of April (sooner or later, however, as the spring may be more or less forward) they

they begin to vegetate, and the foliage on the tops of their bulbs to put on a sort of bushy appearance, and which alone implies their becoming wholesome and nutritive.

If at this time sheep are introduced to them *without* pulling them up, and splitting them through the middle, (which, by the way, ought never to be done) they enter with their teeth on its bulb near the top, and scooping downwards within its ligneous tunic, soon form a calix or cup, containing, according to the size of the bulb, half a pint, more or less; and which the sap, *at its critical period* suddenly and actively rising, will fill to the top, and frequently flowing over, will run down the sides of the ridge to the length of twelve or twenty inches; or if, not being allowed more than a sufficiency, the sheep devour its flesh, tunic and all, below the surface, and afterwards by their tramplings cover up with dust the remaining part of it; the same disposition prevailing therein, will send up the juices through such dust, flowing in like manner to a considerable distance. At this time, also, the tunic or skin will be found easily separating from the flesh, or internal part of the bulb, as from the same cause, *i. e.* the ascent of the sap, will the bark be separated from the tree it has covered. If without regarding these intimations sheep are brought on them sooner in the season, and cold and wet weather should ensue, while they consume a fourfold quantity more than they otherwise would,

would, they will frequently be affected with a sort of white flux; their faeces coming away in a fluid state, and with a white and very singular appearance; while the animals themselves appear wretched, and greatly distressed, and their flesh to be daily falling away. In this case, they are to be immediately removed, and other food given them, (where it may be found) and they will recover without further harm; and when the proper season arrives, as above described, they may again be introduced to these roots, without danger of their being again so affected. There will sometimes, in a dry season, and where on a dusty surface sheep may the day before have dropt their urine, be seen a cast of a deep red colour, as if they were affected with the red water, or made bloody urine; this, however, will not be the case; and as no harm has been known to have accrued from it, no attempts have been made to investigate its cause. It appears wholly to result from a junction of the specific urinal salts, derived from the plant, with those of the earth they unite with; perhaps local, and peculiar to few soils only.

As a proof of the permanent, warm, and nutritive qualities of this plant, used in *its proper season as above described*, if hay be given to sheep feeding thereon, and while they are allowed their fill of the roots, it may be observed, they will for the most part reject it; or, however, taking only a little, as it were to change their palates, their consumption of this

most expensive article will comparatively, with respect to what is requisite at other times, be very trifling, and frequently none at all; while with the plant itself they appear to be so entirely satiated, as frequently after their meals to be seen for some hours lying down, and in a very singular manner composing themselves to sleep. So far is this permanent bulb from requiring dry meat as a concomitant, or auxiliary, that if there happen to be a pond in the field, the sheep will frequently be seen drinking thereat; a fact seldom or never observable when, in the spring months, they are feeding on any other green vegetable, or edible root.

Finally, as a confirmation of the whole of these commendatory narratives, the writer, during twenty years practice, found the produce of an acre of these roots, uniformly, and on an average, adequate to the support of 70 sheep during four weeks of the most hungry, the most trying, and most critical season in the year;—his land, at the present rate, worth about 13s. an acre, and each acre producing between 7 and 8000 plants, of about four pounds weight one with another.

From the above valuable properties not having been fully ascertained, or detailed at length before; and from trials, made chiefly in a more fugitive transient way, wherein nothing appropriate seems to have been regarded, either with respect to culture or time of expenditure; the plant, having frequently been

been called into use, has, for the most part, as regularly been thrown aside and neglected. Some also, who, with the best intentions, have given directions for its culture, have therein unknowingly, contributed greatly to its disgrace, and to the prevention of so valuable an acquisition having been generally made, and converted to its most appropriate use and purpose. From trials made on fertile or certain local soils, favourable in their genius to the growth of this vegetable, it has been announced in several publications, that the expence of transplanting it from a seed bed may be saved; and that its seeds, committed by the broad-cast method of culture, will succeed quite as well. These directions, *very unfortunately* involving a two-fold species of error, have induced many, through a mistaken parsimony, to adopt the mode; and having therein altogether failed, they have set aside the plant as totally useless, and undeserving of further trial. The writer of this (superintending himself the operation) has frequently had the plants removed from the seed-bed, and set growing in the field, at the expence of 2s. or 2s. 6d. an acre, and afterwards let the hoeing, the ridges only, at 3s. more; which together is the customary price given for hoeing an acre of turnips; and with regard to the additional culture given by the plough, not including the benefit derived to the incumbent crop, its expence may very impartially, and with great propriety, be posted to the account of the subsequent

barley crop, as a better fallow for the purpose cannot possibly be given. In proof of the ineligibility of the mode in the uplands and wolds of this kingdom, (where, as before described, the adoption of the plant is most indispensably necessary) and to confront arguments continually advanced in support of it, the writer, during twenty years practice, frequently strewed seeds of this plant promiscuously with those of the common turnip; while their subsequent growth and appearance as constantly superseded the necessity of any thing further for the purpose, always wretched and diminutive, they were never for any other deserving of a thought.

As a further proof of the wrong ideas hitherto entertained of the value and appropriate use of this plant, in the list of premiums offered by the Society of Arts in the Adelphi, for its growth and application, a certificate is required of its weight BEFORE HOUSING, &c.

After a long continued series of practice and observation, it is the opinion of the writer, (without, however, his having made any particular trials for ascertaining it) that the produce of an acre expended in the way above directed, viz. during the rising of its sap, would be worth that of four others at least, consumed at any other period, or by a different mode. He having, some years since, been repeatedly honoured with premiums by that respectable body, for the culture of this vegetable, and his letters

thereon,

thereon (greatly obscured by errors of the press) having appeared in the first two volumes of their transactions, wherein, by implication, the trial of it was recommended to the inhabitants of our sister kingdom north of the Tweed; it will be in point here to observe, that *the next year* a spirited trial accordingly took place there; and in the subsequent volume of the Transactions is given the following account of it:—“ We made a fair trial of the turnip-rooted cabbage at Cullen-House last year; they succeeded beyond expectation, and there are as many seeds of them preserved this season as would sow a whole county. I intend to send a considerable quantity to Sir R. RAMSAY and Mr. BARCLAY, of Ury, together with the two volumes of the Transactions of the Society, instituted at London, for the encouragement of Arts, Manufactures, and Commerce; in which the directions for cultivating them are contained. I cannot entertain a doubt of their supplying the want of spring food after the turnips are exhausted. The sheep eat them greedily, preferring them to every other sort of food. The roots in general weighed from eight to ten pounds; a few of them more.”

That the natives of Scotland at large are more attentive to improvements, and all useful discoveries, than ourselves, where their interests are concerned, will be thought no new observation; however, although it does not appear that they have yet discovered,

vered the characteristic properties of this plant, as above described, and in what its chief use and value consists, or have at least anywhere published the same; it is at this time, perhaps, worthy of remark, that if at Cullen-House (the seat of the Earl of FINLATER, in Banffshire, near the northern extremity of Great-Britain, and more than six degrees north of us) they can grow on an acre of land, and preserve through their intensely-severe winters, food sufficient for a month's consumption of an hundred and forty sheep, during the critical spring season; such being the case, conformably to experiments constantly carried on here, we are somehow, and whatever be the cause, *farther south of our neighbours, in point of improvement*, than, specifically, Englishmen ought to consider themselves.

That a frigid atmosphere may operate kindly in strengthening the vascular system, and brightening the human intellect, it may be necessary to allow; but that our northern friends, six degrees nearer the pole, should *thence* give us the go-by in matters of *vegetation*, and furnishing provisions for the table, ought not perhaps to be so reconcileable to English feelings; nor is it in any wise sanctioned by the venerable Fabulist, in his instance of the sun and north wind contending for victory.

Since the reports before-mentioned were made to the Society of Arts, &c. no interesting observations or material improvements have taken place here, either

ther with regard to the culture or expenditure of this vegetable, unless in the instance of ewes and lambs.—As in the *first* volume of the Society's Transactions it is mentioned, that although the flesh of its bulb had been considered as firm and nutritive, its juices were not, however, with the ewe, thought to be sufficiently productive of milk, and that the lamb in consequence sustained injury;—and as before the publication of their *second*, an account had been given in of a very reconcileable mode having been discovered, in suffering the lambs to run out, through hurdles properly made, to feed on the herbage of the field at large, and that thereby they at least kept pace with their dams;—it may now be proper to adduce, that since that time we have had frequent instances of the lambs having, when so fed, grown fat, and even fit for the butcher. What further has been ascertained of the properties of the plant, is here given in detail; and, unless something better may be found, it is hoped it may in its turn, where breeding flocks are kept, and particularly on upland farms and of congenial soil, be universally adopted.

That the plant will succeed in all situations alike, even where soil and clime, separately or conjunctively considered, may be *thought* apparently similar, the writer has had too much experience to assert. That all soils have certain local invisible peculiarities, every observing experienced farmer is well apprised of;

of; while the cause, it must in candour be acknowledged, has hitherto, in great measure, eluded the researches of our most vigilant and refined philosophers. “ But Jove himself (said an ancient author) “ willed the ways of tillage not to be easy, and first “ commanded to cultivate the fields by art; wheating “ the minds of mortals with care, nor suffered he “ his reign to be inactive in heavy sloth.” It is, however, believed, that few plants are of more general growth, or wherever sheep are bred, may be more usefully brought into culture.

What follows relates to the mode of culture, hitherto successfully used, for the information of those who may not yet have considered the subject.

A seminary, or seed-bed, must first be sought; for every acre to be planted in the field, a provision must be made of three perch, rods, or poles, *i. e.* a square bed (and in a fenced garden, if convenient) of ten yards one way, and nine the other; the more rich the better, and at all events clean, and particularly devoid of the seeds of weeds. This, supposed to have been prepared by a winter fallow, must, about the middle of April, be covered with some short manure; and horse-dung, fresh from the stable, without however the siftings of barn-chaff, and leaving the long part on the mixen, will be very proper, as its effluvia powerfully counteract the devastations of the fly. This must be immediately covered by a shallow furrow, either of the spade or plough, and

and half a pound of genuine seeds be sown thereon, and covered in with a strong rake, or light harrow; or if the provision has not been made, a piece of turf, pared and burnt, and dressed in like manner, will answer well the immediate purpose; or in lieu, recourse may be had to the subsoil of a winter sheep-fold, the straw, dung, and a thin turf having previously been removed. As the plants rise, the fly must sedulously, and may *here easily*, be attended to; and if their depredations are discovered, let wood-ashes or soot be slightly, however immediately, strewed over the bed, the operator walking on the windward side, and repeated if necessary.

If before Midsummer, the time for removing the plants to the field, they are observed to advance too fast in their growth, or their stems, from weeds having arisen among them, or any other cause, are drawing out to an improper length, and as thereby they might in a degree lose a proper shape never to be regained, they may in either or both cases, be prevented by the following method:—Begin drawing them clean up on one side of the bed, and turning the earth over whereon they stood four or five inches deep with a spade, lay them along the trench forty or fifty in every yard; their roots being then covered with the earth of the next spit, must be gently trodden down, and the digging continued until another trench be formed, about twenty inches from the first, to be supplied in like manner with

plants,

plants, the next at hand from the seed-bed; and thus regularly proceeding, all must be removed that require it. This checks their growth, and renders them less liable to injury when removed to the field. The operation, however, if the soil and manure be both tolerably free from other seeds, will be very seldom found necessary. The plot, intended for their reception at Midsummer, ought to lie in the most fertile part of the turnip-field, but by no means on a clay soil; as, although they may be better able to contend with its tenacity than the common turnip, should wet weather come at the time of their being consumed, it will be found very inconvenient in the feeding of them on the spot, and the land, in all probability, would be thrown out of its season for barley; while to haul them away, if the soil should be at all poachy, would be still more troublesome. The reason for giving it elsewhere the best part of the field, is under the view of making the less land suffice for the purpose; as the subsequent barley-sowing must necessarily be retarded longer than might otherwise be thought eligible. The plot determined on ought to be well fallowed and pulverized, and eight waggon, or a proportionate number of cart loads of dung or compost dragged in on an acre. It must then, and immediately, be thrown into one-bout ridges with the common plough, unless the double-mould board one may be obtained, which would be by far better.

At Midsummer, (if the weather be rainy, so much the better; if not, without long waiting, provided, as before directed, the soil has preparatorily been reduced and made fine) let the plants be drawn from the seed-bed, and tied in bundles of about the size of a peck measure, each with seven or eight unbroken wheaten straws, previously a little moistened with water. A tub of water standing by for the purpose, let the root-end of these bundles be dipped therein, and then placed, with their leaves downward, closely in a cart or waggon; and which being filled with these bundles, root to root and leaf to leaf, may be drawn to the field with, thus conducted, immense numbers of plants. Being there arrived, and women and children employed for the purpose, let each take a bundle on the left arm, and breaking the straw-band, drop the plants singly along the tops of the ridges, at about the distance of two feet from each other, while dibblers, either men or women, one to a ridge, follow after, and with the common dibble or setting-pin, plunge them up to the setting on of their leaves, and close them firm in the mould. Here the master, or superintendant, walking behind, must be attentive to the point of the mould being well closed to the roots in every particular row; or some of the dibblers, in view of keeping pace with the others, will ease themselves in this case, and move on without paying due regard to it. It is performed by a stroke or two with

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the point of the dibble, and on its being properly executed the success of the crop will, in dry weather, very materially depend.

If more bundles of plants may have been brought to the field than can be planted the same day, let them (and indeed all others) be kept, as far as necessity will permit, from the action of the sun and wind. The plantation being finished, a vigilant lad may be found necessary for two or three days to keep off the daws and rooks; for these, perceiving the plants in a withered state, will sometimes be led, by *instinctive error*, to suppose there are grub-worms at their roots, and draw them up again much faster than they were planted.

At the end of about a fortnight (more or less) after planting, the ridges will require hand-hoeing, and the plants thereby to be a little dressed. Soon after this, let the common plough pass twice along each interval; and if the land be clean, and not too compact and close, turn a furrow toward each row, taking care not to bury the plants; if otherwise, the furrows must be turned from the rows, and a ridge be formed thereby in the middle of each interval, bringing the plough for the purpose within about three inches of the plants. This ridge must, within a fortnight or three weeks, in dry weather preferably, be returned again to the rows, and soon after be given another hand-hoeing. This last procedure may with some be thought too expensive; but let it be

be remembered, that the whole is only equal to a single ploughing, and that the two partial hoeings may be executed for, or nearly, the same price that is usually given for hoeing an acre of turnips; and as the process will not be necessary where the land may not be too condensed, and foul for subsequent crops, it will be obvious that a better method cannot be adopted as preparatory for these, while the growing one will be, perhaps, in an equal degree availed of its benefits.

The time proper for feeding being arrived, (about the middle of April, sooner or later, and indicated by the tops of the plants, after having lain dormant awhile, putting on a bushy appearance, as before described) the sheep are to be introduced to them, as to common turnips, with hurdles, &c. and the roots to be preparatorily pulled up with a light mat-tack-like hook, having a claw on one side of about nine inches length, with a transverse edge at its end of about two inches width, and on the other a kind of hatchet, or more properly cleaver; with this the roots may be taken up with ease, its handle, of about three feet and a half in length, acting as a lever for the purpose. When the root is up, it receives a stroke or two with the side of the implement, by which its fangs are in a degree divested of their dirt; and another with the hatchet, or cleaver, on its back, which divides it in two; by such division the sheep's teeth being introduced to the centre of

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the bulb, they work their way outward to the shell, and thus, with great facility, devour the whole, or nearly, shell, fangs, and all. Without this method the feeding would be much more difficult, the bulb being coated with a hard ligneous substance, necessary to its preservation through the winter. Tegs, or one-year old sheep, wethers, and indeed all dry sheep, are preferably to be fed on this root; and when it becomes necessary to introduce couples, or ewes with lambs, thereon, a few small holes, calculated for preventing the sheep, but letting the lambs through, to feed on the foliage of the field at large, must be made in certain of the hurdles. The good effects of this will soon be perceived in the lambs themselves, while nothing could be better adapted for preserving the bulb, and preventing it from throwing out too liberally its juices into leaves and branches.

Were a knowledge of the real properties of this plant generally diffused, it would probably have the happiest effects in preventing in future such general fatality among sheep and lambs, as has this year taken place:—and were it universally understood, that its specific excellencies are not, as hitherto supposed, and often asserted, merely resisting frost, and coming to perfection when turnips are all spent; but that it afterwards, although found, will be of very little use until the season arrives wherein little else can be had, and that it should hence be kept in reserve

reserve for the *greatest exigence* of those who may have been provident enough to secure it;—it is hoped that it would experience a more general trial, than has hitherto been afforded it, and that (prejudice therein removed by conviction) it would be as generally sought after and adopted. And it is further wished, that some one will ere long be able to give an experimental and detailed account of the Rutabaga, or Swedish turnip; the writer not having had sufficient experience to authorise him in the attempt. He however conceives, that it is originally of the same species, or nearly, with the above, and that their difference rather consists in the habits\* of each, than in aught besides; one being brought from a clime less distant from the pole than the other, may probably be commensurately more backward in the

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\* That habits govern as arbitrarily in the vegetable as in the animal world, needs only inspecting the subject to be convinced of. From instances universally displayed, may be selected that, unalterably prevalent, in the Laurustinus shrub, originally derived, as I have been informed, from the Cape of Good Hope; which, although it may have continued to be propagated here by the various modes of cuttings, laying, &c. probably during a century, still tenaciously and invariably retains its original and determinate periods for the rising and descent of its sap; and whose action, at its greatest height, accordingly produces flowers here in great profusion at Christmas, although its native latitude lies 17 degrees nearer the line than ourselves. The position allowed, and exigencies requiring better economy, one would surely think it a laughable suspension of the mental faculties not to discern, and an unpardonable inconsistency and negligence of the human powers not to avail ourselves of it, as readily as of any other known property of vegetables.

ascent of its sap. If this happily, from a series of experiments, should be found to be the case, and that it may therein be found as appropriate to the support of our sheep, from the beginning of March to the middle of April, as is the turnip-rooted cabbage, from thence to the latter end of May, it would probably be a new and much more valuable discovery respecting it, than any that, with us, has hitherto been made. It is, however, observable of this plant, that its flesh is of an extremely rich and nutritive quality, even in autumn, and if not found to succeed as above, might, in some instances, by certain appropriate means be then, probably, housed to advantage for this and other purposes. If with a view to getting our sheep comfortably and in an uniform way through the winter and spring seasons, the turnip-rooted cabbage should be adopted, it will be one point gained, and probably the most essential; as the common turnip will, preferably to every other matter, be used through the earlier part of those seasons, and will not unfrequently carry sheep fed thereon to the proper season of the plant in question, which will for a certainty complete the work, and introduce them to grass, vetches, &c.

The writer deems it necessary only further to observe, that being acquainted with three or four sheep-masters, who having some years ago adopted the culture of the turnip-rooted cabbage, and who having not by choice been without it any season since,

he yesterday called on them separately, and putting to them the following questions, (nearly in the same way) received answers from each, of very similar tendency, and nearly to the following purport:—

*How are the ewes and lambs?*—Very well. *How is the turnip-rooted cabbage?*—Very good; but not enough. *What would have been the consequence, if you had been without even what you had?*—Distress! fatality! destruction! *How many lambs have you lost?*—Very few, not more than usual; none from want of food, nor are any hurt, &c. &c.

The intelligent reader will judge how far such answers could have been generally obtained, where the turnip-rooted cabbage was not cultivated.

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#### ART. XXII.

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[The following most useful Compendium is printed in a convenient size for the pocket, and may be purchased at this Society's Rooms, by application to the Secretary.]

*The Farmer's, Grazier's, and Butcher's Ready-Reckoner; a short Table, by which the Weight of Stock, according to the different usages in England, can be ascertained; and the Value of Stock of any Size, with the difference, at once discovered.*

[By the Right Hon. Lord SOMERVILLE.]

THE many difficulties arising from the different modes of calculating the weight of stock, namely, by the score of 20 lb.—the stone of 14 lb.—

the stone of 8lb.—and the hundred, have induced the publisher to put together a table, by which these will at one view be equalized; and another table also, by which the neat value of stock, from 3*1*d. to 7d. a pound, may be instantly obtained.

It is well known, that in the London markets the mode of calculating the weight both of sheep and cattle is by the stone of 8lb.; in the north and east parts of England, by the stone of 14lb.; and in the south, west, and north-west parts of England, as well as Wales, by the score of 20lb.—The score, therefore, as being the most usual, is adopted, and placed at the head of the second table, which gives the neat value at so much a pound, and the others are made in the first table to equal this, as before observed:—For instance,

A value is to be set on a fat ox—his weight is first laid at 45 score; he is supposed to be worth, according to the price of meat, we will say 6*1*d. a pound—45 score, that is 6*1*st. 4lb. at 14lb. to the stone; that is 11*2*st. 4lb. at 8lb. to the stone; at 6*1*d. a pound, the value of the ox will be 2*1*l. 7*s*. 6*d*.

Or a sheep whose weight is laid at 25 pounds a quarter, that is 5 score, at 7d. a pound, is worth 2*1*. 18*s*. 4*d*.

Should there be occasion to get at the value of a sheep or a lamb by the pound, of a less weight than the first number in the table, 1 score or 20lb. it may be done by taking the *half* of any of the weights

## A SHORT TABLE,

By which the WEIGHT of STOCK, according to the different Usages in England, can be ascertained; and the VALUE of STOCK of any Size, with the Difference, at once discovered.

Scores at	3 $\frac{1}{4}$ d.	3 $\frac{1}{2}$ d.	3 $\frac{3}{4}$ d.	4d.	4 $\frac{1}{4}$ d.	4 $\frac{1}{2}$ d.	4 $\frac{3}{4}$ d.	5d.	5 $\frac{1}{4}$ d.	5 $\frac{1}{2}$ d.	5 $\frac{3}{4}$ d.	6d.	6 $\frac{1}{4}$ d.	6 $\frac{1}{2}$ d.	6 $\frac{3}{4}$ d.	7d.	7 $\frac{1}{4}$ d.	7 $\frac{1}{2}$ d.	7 $\frac{3}{4}$ d.	Difference		
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.		
1	0 5 5	0 5 10	0 6 3	0 6 8	0 7 1	0 7	0 7 11	0 8 4	0 8 9	0 9 2	0 9 7	0 10 0	0 10 5	0 10 10	0 11 3	0 11 5	0 0 5					
2	0 10 10	0 11 8	0 12 6	0 13 4	0 14 2	0 15	0 15 10	0 16 8	0 17 6	0 18 4	0 19 2	1 0 0	1 0 10	1 1 8	1 2 6	1 3 4	0 0 10					
3	0 16 3	0 17 6	0 18 9	1 0 0	1 1 3	1 2	1 3 9	1 5 0	1 6 3	1 7 6	1 8 9	1 10 0	1 11 3	1 12 6	1 13 9	1 15 0	0 1 2					
4	1 1 8	1 3 4	1 5 0	1 6 8	1 8 4	1 10	1 11 8	1 13 4	1 15 0	1 16 8	1 18 4	2 0 0	2 1 8	2 3 4	2 5 0	2 10 4	0 2 1	2 16 8	2 18 4	0 2 1		
5	1 7 1	1 9 2	1 11 3	1 13 4	1 15 5	1 17	1 19 7	2 1 8	2 3 9	2 5 10	2 7 11	2 10 0	2 12 1	2 14 2	2 16 8	2 18 4	0 3 4	0 11 13	0 13 4	0 3 4		
20	3 8 4	5 16 8	6 5 0	6 13 4	7 1 8	7 10	7 18 4	8 6 8	8 15 0	9 3 4	9 11 8	10 0 0	10 8 4	10 16 6	11 3 0	11 13 4	0 10 5	11 13 8	11 14 11	0 10 5		
25	6 15 5	7 5 10	7 16 3	8 6 8	8 17 1	9 7	9 17 11	10 8 4	10 18 9	11 9 2	11 19 7	12 10 0	13 0 5	13 10 10	14 1 9	14 11 8	0 10 5	14 11 0	0 12 6	0 12 6		
30	8 2 6	8 15 0	9 7 6	10 0 0	10 12 6	11 5	11 17 6	12 10 0	13 2 6	13 15 0	14 7 6	15 0 0	15 12 6	16 5 0	16 17 6	17 10 0	0 12 6	17 10 0	0 12 6	0 12 6		
35	9 9 7	10 4 2	10 18 9	11 13 4	12 7 11	13 2	13 17 1	14 11 8	15 6 3	16 0 10	16 15 5	17 10 0	18 4 7	19 19 2	19 13 9	19 20 8	0 14 7	19 13 8	0 15 0	0 14 7		
40	10 16 8	11 13 1	12 10 0	13 6 8	14 3 4	15 0	15 16 8	16 13 4	17 10 0	18 6 8	19 3 4	20 0 0	20 16 8	21 13 4	22 10 0	23 0 0	23 10 0	0 18 9	25 8 8	26 5 0	0 18 9	
45	12 3 9	13 2 6	14 1 3	15 0 0	15 18 9	16 17	17 16 3	18 15 0	19 13 9	20 12 6	21 11 3	22 10 0	23 8 9	24 7 6	25 8 8	26 5 0	27 1 0	28 9 6	29 3 4	1 0 10		
50	13 10 10	14 11 8	15 12 6	16 13 4	17 14 2	18 15	19 15 10	20 16 8	21 17 6	22 18 4	23 19 2	25 0 0	26 0 10	27 1 8	28 9 6	29 3 4	1 0 10	28 11 1	29 1 8	1 2 11		
55	14 17 11	16 0 10	17 3 9	18 6 8	19 9 7	20 12	21 15 5	22 18 4	24 1 3	25 4 2	26 7 1	27 10 0	28 12 11	29 13 10	30 18 9	31 1 8	32 1 8	1 2 11	33 0 0	1 1 10		
60	16 5 0	17 10 0	18 15 0	19 20 0	21 0 0	22 10	23 15 0	25 0 0	26 3 0	27 10 0	28 15 0	30 0 0	31 3 0	32 10 0	33 15 0	35 0 0	35 0 0	1 1 10	37 1 1	37 1 1		
65	17 12 1	18 19 2	20 6 3	21 13 4	23 0 5	24 7	25 14 7	27 1 8	28 8 9	29 15 10	31 2 11	32 10 0	33 17 1	35 4 2	36 11 3	37 16 4	39 7 6	40 16 8	1 9 9	3 9 9		
70	18 19 2	20 8 4	21 17 6	23 6 8	24 15 10	26 5	27 14 2	29 3 4	30 12 6	32 1 8	33 10 10	35 0 0	36 9 2	37 18 4	39 7 6	40 16 8	1 9 9	43 14 0	1 11 5			
75	20 6 3	21 17 6	23 8 9	25 0 0	26 11 3	28 2	29 13 9	31 5 0	32 16 3	34 7 6	35 18 9	37 10 0	38 1 3	40 19 6	42 13 4	45 0 0	46 13 4	1 13 4	46 13 4			
80	21 13 4	23 6 8	25 0 0	26 13 4	28 6 8	30 0	31 13 4	33 12 11	35 8 4	37 3 9	38 19 2	40 14 7	42 10 0	44 5 3	46 17 0	49 13 3	49 11 8	1 13 5	49 11 8			
85	23 0 5	24 15 10	26 11 3	28 6 8	30 2 1	31 17	33 15	35 12 6	37 10 0	39 7 6	41 5 0	43 2 6	45 17 0	47 10 0	49 9 7	51 8 2	53 8 9	55 8 4	1 17 7			
90	24 7 6	26 5 0	28 2 6	30 0 0	31 17 6	33 15	35 12 6	37 1 1	39 11 8	41 11 3	43 10 10	45 10 5	47 10 0	49 9 7	51 8 2	53 8 9	55 8 4	1 19 7				
95	25 14 7	27 14 2	29 13 9	31 13 4	33 12 11	35 19	37 12 1	39 11 8	41 11 3	43 10 10	45 10 5	47 10 0	49 9 7	51 8 2	53 8 9	55 8 4	57 7 2	58 8 8	59 8 4			
100	27 1 8	29 3 4	31 5 0	33 6 8	35 8 4	37 10	39 11 8	41 13 4	43 15 0	45 16 8	47 18 4	50 0 0	52 1 8	54 3 4	56 5 0	58 7 2	59 8 4	59 10 0	61 8 4			

weights specified; or to get at the weight of an ox heavier than the highest number, which can very rarely happen, it may be done by taking the *double*.

In calculations of this sort some inaccuracies may possibly occur; but as these tables were drawn up by a very good accomptant, and have since been carefully corrected, the publisher flatters himself none will be found.

Scores.	Stones, at 14lb.		Stones, at 8lb.		Hundred, 112lb.		
	St.	lb.	St.	lb.	Cwt.	qrs.	lb.
20 equal	28	8	30	0	3	2	8
25 —	35	10	62	4	4	1	24
30 —	42	12	75	0	5	1	12
35 —	50	0	87	4	6	1	0
40 —	57	2	100	0	7	0	16
45 —	64	4	112	4	8	0	4
50 —	71	6	125	0	8	3	20
55 —	78	8	137	4	9	3	8
60 —	85	10	150	0	10	2	24
65 —	92	12	162	4	11	2	12
70 —	100	0	175	0	12	2	0
75 —	107	2	187	4	13	1	16
80 —	114	4	200	0	14	1	4

## ART. XXIII.

*Two Letters on useful Modes of PLANTING, and  
on PREVENTION of SMUT, &c. &c.*

Addressed to the SOCIETY.

[By Mr. JOHN WAGSTAFFE.]

GENTLEMEN,

I Was lately told, by a gentleman of distinction, that, in the present taste of designing the pleasure-grouns, the fruit and kitchen garden must necessarily be at a distance from the villa. Whether this taste be fastidious or natural, I pretend not to examine. It is sufficient to observe, that as the utility of these gardens is more and more acknowledged, their contiguity, or remote distance, is the less material; for which reason I shall propose, as a plan for useful imitation, what has lately been practised by a gentleman distinguished for his rural economics, and for converting a reputed barren soil to purposes of agriculture, and more peculiarly raising a forest on a large circuitous tract of waste, where it was generally believed no forest-tree could be raised three feet from the ground. Yet it is within these planted improvements that this additional improvement has succeeded, and every culinary plant common to our country, as well as their rare varieties,

varieties, are seen in abundant perfection within this well-fenced, trenched, and manured inclosure.

The scite is a gentle declivity open to the south, (and some few points to the east and west) while to the opposite quarter the ground rises rather abrupt; above which stretches an extended neck or platform, nearly east and west; and a steep acclivity advances to the north, the ridge of which height, planted with resinous trees, whose perennial foliage defends it from the severity of that quarter, will probably render innoxious the frequent blighting gales that blow from it, and its connecting quarter the east. On this extent of level are planted the various orchard-trees, skirted on its side, and sometimes sides, with divers ornamental shrubs; some of which may be included in the plan of utility. Beneath this platform, open to the benign quarters, is the kitchen-garden, intersected by walls, frequently curving in a crescent form, where the concentrated and longer-reflected rays of the sun quicken to maturity and more perfect flavour the various species of wall-fruit affixed to them; with this farther advantage, that their reflex warmth promotes, within the divisions they form, the fallads, pulse, and, generally speaking, the roots which they inclose.

I speak but little of a *hot*, or rather *green*, house, within their boundaries, as the amusement of the curious in foreign productions can hardly be included within the general subject of utility, which

(this

(this exotic assemblage excepted) pervades every division of this well-cultured and exceedingly fruitful garden. But a mile or two beyond its boundary the baronet has set an example, worthy of adoption by every possessor of manorial land in the kingdom. Adjoining the publick road between Norwich and Lynn, is a considerable diffusion of ground beyond what the statute for a publick road requires: this useless extent he has inclosed generally in a straight line, diverted here and there by a curvature, which ground he has had deeply trenched and planted with potatoes; and at due distances sapling-trees, particularly beech, which is less frequent in this part of the kingdom than any of the timber-trees of Britain; last year, the spring of 1797, was their first planting.

The potatoes were productive beyond their common degree. On the renewal this year with potatoes, there did not appear to me an expediency of replacing a single tree; the first trenching at once giving fertility to the soil, and insuring a larger production of this farinaceous and most valuable root; the soil being thus prepared for the striking and due extending of every fibre of the infant timbers, the summer herbage of the potatoes shading their roots from an excess of sun, while the taking up of their roots tends to facilitate the trees' further progress. In fine, the potatoes are as promising this year as the last, while the trees are flourishing with a superior luxuriance of branch and leaf; giving an indication

indication of forming timbers in a less period than in the common mode, where the soil is neither trenched nor re-opened.

I am, with much regard,

Your respectful friend,

JOHN WAGSTAFFE.

Norwich, 1798.

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GENTLEMEN,

THE following remarks are proposed, as supplementary to experiments that have already been communicated to you, which, I trust, will be advantageously perused by some practical agriculturists; especially those remarks which are commendatory of œconomy in seed, whence early and repeated hoeing becomes indispensable; resulting from this manual operation, the produce of mine (from less than a bushel of seed per acre) exceeded in quality and quantity double that of an equal quantity of seed dibbled on land nearly adjoining; land of equal quality, and equally well manured.

The spring appearance of my neighbour's was exceedingly promising, but a pretty deal of rain falling in that season, it flourished too much, and much

much of it was laid before the due fructification had taken place; mine, solely, I conceive, from early hoing, maintained its upright position, and thence advanced to healthful maturity, whereby its grain was specifically weightier at *all times*,\* than any wheat of the neighbourhood, and clear of extraneous seeds when dressed.

I conceive, from the premises stated, it follows as an easy deduction, the cleaner the land the more nutriment it dispenses to the subject of tillage; its uncrowded state, rendering it easily accessible to every means of nourishment, exposes it to due ventilation, and consequent evaporation, which preserves the corn in health, and becomes the means of every possible perfection.

It has been already advanced, that the cure of smut in wheat is effected by water alone, either by sinking a vessel that contains the seed beneath the running stream, or immersion in standing water; under either circumstance, stirring it briskly, whereby the balls, if any, of this pernicious substance will float away, or may be skimmed off; and if there be not any of them, but some of the powder adhering

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\* It may strike the apprehension of some readers, that the distinction of time respecting weight is unnecessary; but it is a fact, that there are numerous pounds in a quarter difference betwixt a dry and humid, on operating disadvantageously to the buyer in the latter. This wheat varied from its more general weight more than a pound per bushel, yet always maintained its pre-eminence at the same period over other wheat.

to the seed-wheat, this active stirring, or brushing, may cleanse it from every particle of this infecting matter; that even black wheat may be thus purified, so as to be productive of pure grain. Nevertheless, wheat not obviously foul had better be preferred; yet one of the most judicious farmers in this neighbourhood deems he should run no risk in taking the most smutty wheat, when subjected to this process; confirmed in his opinion from having observed the universal clearness from smut on every acre of wheat in this parish, under divers occupiers, where the elementary fluid has been used; in which persuasion he is more fully established, from knowing that one little farmer within this parish, who last seed-time was not acquainted with this simple process, had his seed-wheat for two acres cured in the old provincial mode. Some of his neighbours have said, that he had more than a twentieth part brand, (smut) and he has acknowledged to me, he cannot make sale of it unless the sheaves are severally picked previous to threshing.

I thought it necessary to adduce this circumstance, as it shews that the disease in question is neither in

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\* It is more than possible, that winds may waft from infected acres this powder, and thereby infect a wheat-field perfectly clean; and it is possible, that this bane may be conveyed from barley and from oats; which strengthens the necessity of washing all seed, though apparently pure. The smut of barley is more frequently dispersed than that of wheat; its sooty ears are frequently obvious to the superficial observer.

earth, air, or season, and amounts, in my opinion, to demonstration, that the alone needful preparative is in every one's reach; that simple water, exclusive of every other preparation, comprehends the desideratum of ages—a perfect and radical preservation from this corrupt matter; that at once offends the smell, disgusts the eye, and diminishes in substance the most required of all human food.

I am, with all due regard,

Your respectful friend,

JOHN WAGSTAFFE.

Norwich, 1798.

N.B. J. W. had it in view to communicate, through his valued friend MATTHEWS, some farther progress made this summer, of propagating by water (in the manner as communicated of cucumbers) certain other culinary subjects, particularly kidney-beans, which were planted in garden-pots and set into small pitched troughs, replenished at times with water. These being ranged in stone yards, or gravelly areas, the abundant variety of this plant may be trained up on branches, affixed in sockets on the side of the troughs, whence they will exceed the height of a tall man—successively exhibit their various blossom and fruit, to the amusement and use of those who find themselves interested herein; but

1798

as

as this experiment is only of partial utility, J. W. leaves it to his friend to dispose of it as he thinks proper.—There is not a doubt, but every species of pulse may be thus propagated; but J. W.'s recent experiments have yet extended to only kidney-beans and gourds.

## ART. XXIV.

*Some Observations on the Depredations of Insects  
on FRUIT-TREES.*

Addressed to the SOCIETY.

[By Mr. JOHN HASKINGS, a Country Gardener.]

HAVING made some observations on the propagation of insects, that kind in particular of late, which often injures much of the apple-blossom, has had some of my attention. A friend of mine was speaking to me, at the last blossoming season, of his having a very fine blossom in his orchard, and gave me an invitation to go with him to view the same, which I accepted. On my entering the orchard, at the first sight I plainly discovered that the injury done to the blossom by the insects was so great, that three-fourths or more of it would not produce fruit; (though my friend is a sensible, discerning

cerning man, he had not any idea of this; and when I convinced him of it, he acknowledged himself much surprised.)

Upon examining this orchard through, I found the injury to have extended to almost every tree, in proportion to its blossom; this inclined me to visit other orchards, which I soon after did, both in Dorsetshire and Devonshire; in most of them the injury done by the insects I found to be full as great. The most common time for discovering this insect, and the injury done by the same, is when the other blossoms fall off; for that where the insect is doth never open, but by the time the other falls off this is withered, and then has much the appearance of a brown berry; within this is the insect, which, at first sight, has much the appearance of a white worm, but by minute inspection the legs and wings at this time may be seen. It is, when thus discovered, in a suspended state; in about a fortnight after, it comes to perfection, and is then a black fly, with *housed* wings; it flies but little, though it walks fast; at the least touch it shrinks together, and then it has more the appearance of a spider than a fly. This insect is hatched among blossom-buds, and as soon as the leaves of the blossoms on the sides begin to loosen it forces its way in, and then, by the web it makes, or by the injury it does by feeding, or by both together, it effectually prevents the blossom from opening; that which

grows

grows within the blossom is its food, and by the time it has eaten the whole thereof, it is full grown, and then it soon becomes in a suspended state. When it first enters the blossom it is a small worm, of an ash colour, with a blackish head; as it grows larger it grows whiter, and retains its whiteness, until it is come near to perfection, and then in a day or two it changes from white to a sooty black; the transfiguration it passes here is from the worm to the fly before-mentioned. To this insect, I believe, might be attributed the failure in apples this year, and not to a blight, as stated of late in the newspapers.

These researches and discoveries cannot be of any benefit to the publick, unless some preventive can be found. I have had conversation with different persons, that in time past have been engaged in smoking orchards, and have been particular in my enquiries on the subject as to the benefit. They differ; for one says, he thinks it has been attended with benefit; while another says, he thinks it has not answered much; but as to the time of performing the work they nearly agree, that is, when some of the blossoms have been for some time open, or so long as to begin to fall off; and then, if they perceive that others have not opened, they suspect the cause to be the worm; and if on examination, they find it to be so, they then smoke the trees. This certainly is the time for discovering the insect,

but

but the injury is done before it is in this way discovered, and what is done cannot be prevented; and I am certain, there is not any thing in nature that can be a remedy for this injury. I know smoke would be beneficial, provided the work be done in proper time. Whenever the blossoming season is warm and dry, a plenty of these visitants may be expected among the trees, and if any man would try the benefit of smoke, the same should be done before the blossom has swollen to any largeness, or at the furthest, before it has opened; for it should be done before the fly has laid its eggs, or before the worm has entered the blossoms; for, I believe, they are not easily removed afterwards, as this affords them a very comfortable habitation, so as to secure them from almost every annoyance; but suppose they are to be removed, the injury they do by feeding for two or three days is such, that the fruit cannot set afterwards.

I have often thought that something might be added to what is commonly used in burning, to make the smoke the more noxious; many things might be mentioned, such as sulphur, tobacco, &c. but this would be thought by some to be attended with more expence than benefit; but soot might be got with very little expence, and I believe would answer much if used plentifully. If any would try an experiment on these things, they might make use of different means in smoking different orchards, or

different

different parts of one and the same orchard. In rainy seasons there cannot be much danger of this insect, as heavy rains cleanse the trees both from flies and worms. Those birds that feed on insects must also be useful among the trees, the most so of all these I think is the *tom-tit*; but I am aware, that here I differ in opinion from many others who are sensible discerning men, for there are many who, so far from considering this little animal as a friend, suppose him to be much of an enemy, and treat him as such. If some men had seen a great number of these birds busy about the blossoms in their orchards the last blossoming season, they would readily have attributed the failure in the setting of the fruit to the injury done by them; but had there been a large number of these among the trees the last blossoming season, I doubt not but some of them would have produced double the fruit they now have. This insect is so small before it enters the blossom, that a small bird would destroy a great number of them in one day; but as the last winter has destroyed most of these birds, there has been but little benefit received from them this season. Small as this insect is, it is a very formidable enemy, the most so that I know of all the insect tribes, as it always destroys wherever it enters; nor has it ever got, neither doth it want, a second to help perform the work; for after one is entered the blossom a

second

second never does, so that as many insects as are within the blossoms so much fruit the less.

I here acknowledge to have held a different opinion of the aforesaid birds, until of late years, and have destroyed a great number of them; but by my researches into these things, I am convinced that I was wrong. At the latter part of a mild winter, which is now five or six years since, the injury that appeared to be done to the fruit-trees by the birds was such, that the ground under the trees in my garden was almost covered with what appeared to be the broken buds; but on visiting a gentleman's garden at a little distance from mine, the gentleman observed to me, *what a fine bud there was on his trees*, and what prospect of a fine blossom; I said, in answer to him, that his trees had not received the like injury that the trees in my garden had, for I supposed that not one bud out of an hundred but had been hurt by the birds. But, to my great surprise, when the blossom came forth, those trees that appeared to be so injured brought forth their blossom as fine, and the fruit set as strong, as on these trees that had not the least appearance of hurt. I was for some time at a loss to account for this, but on further examination, I found it was not the bud, but a worm that we often find therein, on which the birds feed, and what appears under the trees are but the peelings thereof; these worms are hatched in the autumn, and then eat their

their way into the soft part of the bud, which they make their winter residence; here the small birds often seek their food in winter, and which they easily find by a small hole that is in the bud.

When this worm is taken from thence in the winter, or early in the spring, the bud may recover the injury done, by the blossoming season; but if it were to remain there until it voluntarily left the same, the injury would be such, that it probably would produce but little blossom, and less fruit.

Another thing claimed my attention as to the aforesaid trees, which was this, Why the birds had thus worked so much on the first of these, and not in the least broken the bud of the others? Here I supposed, that in the one there was plenty of food, and in the other there was none; but what should be the cause of this difference was yet to be considered. The cause soon occurred to me to be this, the trees thus infected with the insects stand in an open and free air, whereas the other stands near a malt-house and brew-house, by the smoke of both which they are often covered, and it is not likely for the fly to lay its eggs in such a situation, this may be some proof of the benefit of smoke. Some one may be ready to ask, if these birds are so useful in cleansing the trees from worms, how is it that we have so fine a blossom after a hard winter, when most of these birds are destroyed, as in the last? To such a question I would give the following answer, If the frost

be such as to kill the birds, I doubt not but the same will kill the worms, and more effectually cleanse the trees, and with less injury than it is possible for the birds to do. But the propagation of most insects is so great, and so rapid, that it is hardly to be conceived by those who have not made observations thereon; for instance, the common flesh-fly will bring forth some hundreds of nits, each of which will produce a large fly again within one month; some of the lesser flies in less time than these.

From the observations I have made on these things, I am of opinion, that every means made use of by man, which do in the least tend to lessen the number of those birds, whose principal food is insects, ought to be discouraged.

I am, Gentlemen,

Your most humble servant,

JOHN HASKINGS.

*Lyme, Dorsetshire.*



## ART. XXV.

*On the Value of the RUTA BAGA, compared with other Turnips;—and a proposition for instructing Young Men in the New Husbandry.*

Addressed to the SECRETARY.

[By the Rev. H. J. CLOSE.]

DEAR SIR,

*Hordle, May 2, 1799.*

I Forgot to inform you, that my Swedish turnips, in the month of March, after the frosts, without either tops or tails, and perfectly cleared from dirt, weighed thirty-two tons per acre. They were transplanted, and upon ridges of the same size as the Norfolk turnips. I am sorry I omitted to mention this, as but few experiments, I believe, have been made to ascertain the acreable weight of these valuable roots.

I think every farmer, who keeps a large stock, should have a sufficient quantity of these turnips to answer all his purposes through February, March, and April. Indeed, in a few years I believe I shall grow these chiefly. This year I hope to have twelve or fifteen acres of them. I prefer them to the turnip-rooted cabbage, as they are equally impervious to the frost, and if partly eaten by game or vermin, the remainder of the plants do not rot. In short,

they appear to have all the advantages which belong to the turnip-rooted cabbage, without being so very hard as to injure the teeth of the sheep.\* They give butter a fine rich yellow colour, when the cows are fed with them, and some *flavour* with that colour, though not near so strong as the Norfolk turnips. Bullocks fat considerably faster upon them than upon the Norfolk. They will keep, by being stacked, and the tops cut off when they first begin to shoot, until the latter end of May.

But I suppose by this time your volume is printed, and these hints, or rather observations, will prove of no service this year,† except to a few of your correspondents, to whom you may safely recommend them.

But, sir, the purport of this letter is to state to your Society a plan which I have in agitation, the most likely to promote the general agricultural interests of the country. Nothing impedes the introduction of the new husbandry, and the use of the most improved instruments, so much as the obstinacy of the workmen. To surmount this difficulty seems a great object, and it appears to me, that by taking eight clever active young men under my tuition

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\* This objection against the Turnip-rooted Cabbage seems to be obviated by MR. TUGWELL, in this volume.—ED.

† The prefs being open, this letter was of course admitted—and admitted with the warm approbation of the Committee, especially as to the projected plan of Farming Education.—ED.

for one or two years, I may essentially serve my country.

At Michaelmas next I therefore intend to make the experiment. I have a house ready, and a Suffolk bailiff, a very clever intelligent fellow, and his wife a very tidy woman, who are to have the sole management of the family. (Terms to be more particularly settled in due time.)

Thus I shall be able to send a fresh supply of converts to the new system of husbandry, every year, into places in various parts of the kingdom. Other workmen will learn from them, though not from a master so readily. Be pleased to lay this outline before the Society for its opinion.

I am, dear sir,

Your's truly,

H. J. CLOSE.



## ART. XXVI.

*An Account of the PREMIUMS and BOUNTIES given by the Bath and West of England Society, for the Encouragement of the various Objects of the Institution, from its commencement to the present time.*

	£. s. d.
To Mr. Piercy, of Stoke, near Lavington, in Wilts, for raising 20 acres of Norfolk Turnips, and Hoeing them twice	10 0 0
To Mr. William Peacy, of Northleach, for raising and twice hand-hoeing 120 acres of Turnips	7 7 0
To the same, for raising 130 acres of Sainfoin	10 10 0
To J. Lewington, for hand-hoeing with a nine-inch hoe 40 acres of Turnips	3 3 0
To Mr. Blancher, of Attleborough, Norfolk, for his Model of a Portable Crane	5 5 0
To the same, for his Second Model of ditto	5 5 0
To the same, for his Machine for Setting Wheat	5 5 0
To Mr. Kite, for his Model of a Machine for Slicing Turnips	5 15 6
To Mr. _____, for his Model of a Crane	2 2 0
To John Billingsley, esq; of Ashwick-Grove, for raising eight acres of Drilled Carrots	10 10 0
To the same, for raising near 70 acres of Potatoes	5 5 0
To the same, for 15 acres of Scotch Cabbages	10 10 0
To Mr. T. Robbins, of Bold-Down, Gloucestershire, for raising 40 acres of Turnips, twice hoed, on poor land	10 10 0
To the same, for ploughing 442 acres of land with a pair of horses, without a driver	5 5 0

£. s. d.

To Mr. T. Robbins, for raising seven acres of Turnip-rooted Cabbages	—	5 5 0
To Mr. John Alexander, of Manningford, Wilts, for raising 40 acres of Turnips, for autumn feeding, twice hoed	—	19 0 0
To the same, for raising 70 acres of Rye, for sheep-feed	—	5 5 0
To the same, for raising 40 acres of Turnips, twice hoed	—	19 0 0
To Mr. Hewett, of Rolston, Wilts, for raising 70 acres of Turnips, for spring-feeding, twice hoed	—	19 0 0
To Mr. Thomas Bethel, of Weston, for setting 10 acres of Wheat	—	10 0 0
To Robert Proctor Anderdon, esq; for raising a crop of Drilled Turnips, twice hoed	—	5 5 0
To William Edwards, servant to Mr. Winter, for horse-hoeing 33 acres of Beans and Pease, drilled with Mr. Winter's machine	—	3 3 0
To Mr. Nehemiah Bartley, for his Account of Experiments in Husbandry, and a course of crops; a piece of plate, value	—	3 3 0
To the same, for the best crop of Buck Wheat	—	5 5 0
To Mr. William Smith, of Hinton, near Bath, for constructing a Drill-Machine to sow wheat, and other grain	—	5 5 0
To Mr. Charles Fitchew, for the best crop of Turnip-rooted Cabbages, drilled	—	5 5 0
To Mr. John Young, for the best Ram	—	5 5 0
To the Artist who sunk a Dye for the Society's intended Medal	—	10 0 0
To John Hatch, for burning 120 bushels of ashes from fern and weeds	—	5 5 0

	L. s. d.
To George Smith, for burning 152 bushels of ashes from fern	3 3 0
To John Wells, for burning 140 bushels of ashes from fern only	3 3 0
To James Biggs, for burning 160 bushels of ashes from fern and weeds only	3 3 0
To the Rev. Mr. Swayne, for his elegant spec- imens of Grasses, and collection of Grafs- Seeds; a present of plate, value	10 10 0
To Edward Davis, for Sowing Grain with the Drill-Plough	3 3 0
To Daniel Earle, for ditto	2 3 0
To William Vagg, for sowing 30 acres of Wheat, Barley, Pease, and Beans, with Mr. Smith's new Drilling-Machine in a work- manlike manner	2 2 0
To the Right Hon. the Earl of Pembroke, for ploughing near 500 acres (the whole of his arable land) with the Norfolk Plough and a Pair of Horses, without a driver; a piece of ornamental plate, value	5 5 0
To Mr. Henry Vagg, of Chilcompton, for raising 12 acres of excellent Scotch Drum- Head Cabbages, for feeding cattle; a piece of plate, value	5 5 0
To Mr. Henry Vagg's Ploughman, for his great diligence in using and promoting the use of the Norfolk Plough, with a Pair of Horses without a driver	3 3 0
To Mr. John Ashman, for an ingenious Model of a Comb-Pot, invented and used by him, for burning common pit-coal, instead of char- coal, in wool-combing	3 9 0

L. s. d.

To John Ball, gent. for raising and curing Rhubarb; a silver cup, value	—	5 5 0
To Mr. Josiah Hazard, of Wellow, for an Essay on making Butter and Cheese; a piece of plate, value	—	3 3 0
To Mr. George Winter, of Bristol, for sowing Carrot Seed, by means of his patent machine; a piece of plate, value	—	3 3 0
To Mr. Henry Dobson, of Norwich, for the Model of a Barn on a new construction, which contains the least timber in proportion to its contents, and the greatest mechanical and ma- thematical strength; a cup, value	—	5 5 0
To the Rev. Mr. Lamport, of Honiton, for his ingenious Essay for the Improvement of Agriculture, printed in the first volume of the Society's Papers	—	2 1 0 0
To Mr. Benjamin Pryce, of Salisbury, for his ingenious Essay on the most eligible mode of establishing a general Commutation for Tithes; an honorary premium of plate, value	—	10 10 0
To Martha Morley, for instructing Girls to weave black lace	—	5 5 0
To the Friendly Society of handicraftsmen and labourers in the parish of Weston, established conformably to the directions of the Society's Premium-Book	—	10 10 0
To Charity Jones, for reaping five acres of Wheat	—	2 2 0
To William Philpot, labourer, for 14 chil- dren born in wedlock, and bringing up 7 without parochial assistance	—	3 3 0

To John Jefferies, for bringing up 10 children, born in wedlock, without parochial assistance	3 3 0
To Charles Scapin, for bringing up 10 children, born in wedlock, without parochial assistance	3 3 0
To J. Stockwell, for bringing up 10 children, born in wedlock, without parochial assistance	3 3 0
To Samuel Frappel, for bringing up 9 children, born in wedlock, without parochial assistance	3 3 0
To Richard Cottle, for bringing up 10 children, born in wedlock, without parochial assistance	3 3 0
To Moses Ball, labourer, for 11 children, born and brought up as aforesaid	3 3 0
To R. Hurdle, labourer, aged 83, for 9 children, born and brought up as aforesaid	3 3 0
To John Webley, for 8 children, born and brought up as aforesaid	2 2 0
To Richard Tylee, labourer, for bringing up 12 children without parochial assistance	3 3 0

*Rewards for Industry and faithful Servitude. 1778.*

To Barnabas Marshall, for 24 years faithful servitude in one house	—	—	3 3 0
To Mary Hucker; for 30 years ditto	—	—	3 3 0
To Mary Bennett, for 13 years ditto	—	—	2 2 0

1779.

To Samuel Bowman, for 26 years such servitude	3 3 0
To Elizabeth Scratchley, for 37 years ditto	3 3 0
To Margaret Walkley, for 28 years ditto	3 2 0

1780.

To Joanna Hooper, for 24 years such servitude	3 3 0
To Joan Bliss, for 18 years ditto	2 2 0
To Hannah Stockden, for 16 years ditto	2 1 0
To Samuel Abbot, for 18 years ditto	3 3 0

£. s. d.

1781.

To Ann Cais, for 22 years faithful servitude	3	3	0
To Jane Brookes, for 11 years ditto	—	2	2
To William Daniel, for 43 years ditto	3	3	0
To John Harris, for 26 years ditto	—	1	1

1782.

To Stephen Pitman, for 42 years such servitude	3	3	0
To Jane Taylor, for 38 years ditto	—	3	3
To Sarah Hasel, for 36 years ditto	—	2	2
To Sarah Styling, for 19 years ditto	—	1	1

1783.

To Edward Escott, for 25 years such servitude	3	3	9
To Giles Jukes, for 20 years ditto	—	2	2
To Esther Ford, for 31 years ditto	—	3	3
To Martha Gould, for 21 years ditto	—	3	3
To Ann Leigh, for 21 years ditto	—	2	2
To Mary Harvey, for 25 years ditto	—	2	2
To Elizabeth Major, for 10 years ditto	—	2	2

1784.

To Rebecca Newman, for 52 years such servitude	3	3	0
To Abraham Biffen, for 35 years ditto	—	3	3
To Sarah Perry, for 24 years ditto	—	3	3
To Sarah Coombes, for 22 years ditto	—	3	3
To Mary Bracher, for 20 years ditto	—	2	2
To Mary Badler, for 19 years ditto	—	2	2
To Thomas Knight, for 18 years ditto	—	3	3
To Ann Bryan, for 16 years ditto	—	2	2
To George Tomkins, for 11 years ditto	—	2	2

1785.

To Elizabeth Warren, for 22 years such servitude	3	3	0
To Hannah Padford, for 21 years ditto	—	2	2
To Elizabeth Kerley, for 39 years ditto	—	3	3

	£. d.
To Betty Blake, for 21 years faithful servitude	2 2 0
To Susanna Raindale, for 13 years ditto	2 2 0
To Daniel Lewis, for 45 years ditto	3 3 0
To Nathaniel Hill, for 24 years	3 3 0
To Nathaniel Stinchcombe, for 21 years ditto	2 2 0
To Daniel Brownman, for 19 years ditto	3 3 0
To John Parfleet, for 14 years ditto	2 2 0

1786.

To J. Spearing, for 18 years faithful servitude	3 3 0
To Catherine Clark, for 26 years ditto	3 3 0
To Hannah Lewis, for 37 years ditto	3 3 0
To Eleanor Bishop, for 26 years ditto	2 2 0
To Elizabeth Smith, for 33 years ditto	3 3 0
To Elizabeth Waldron, for 22 years ditto	3 3 0
To Joseph Baugh, for 30 years ditto	3 3 0
To David Wring, for 22 years ditto	3 3 0
To George Griffy, for 18 years ditto	2 2 0
To Mary Inman, for 56 years ditto	3 3 0
To Betty White, for 24 years ditto	2 2 0
To Betty Bulgen, for 20 years ditto	2 2 0

1787.

To Jona Budd, for 48 years faithful servitude	3 3 0
To Anthony Wring, for 25 years ditto	2 2 0
To Rabbage Ash, for 39 years ditto	3 3 0
To Margaret Chivers, for 24 years ditto	2 2 0
To William Rose, for 55 years ditto	3 3 0
To Richard Nash, for 43 years ditto	2 2 0
To Sarah Self, for 45 years ditto	3 3 0
To Margaret Brown, for 21 years ditto	2 2 0
To Ann Cryer, for 29 years ditto	3 3 0
To Margaret Glasgodine, for 25 years ditto	2 2 0
To William Gibbs, for 20 years ditto	2 2 0

L s. d.

To Thos. Clark and to Isaac Brockway, fellow-servants, each 20 years faithful servitude	3	3	0
To Betty Hodges, for 32 years ditto	3	3	0

*Miscellaneous Premiums, given for the year 1788.*

To John Chaunt, for 44 years faithful servitude	3	3	0
To Thomas Fisher, for 29 years ditto	2	2	0
To Elizabeth Davies, for 37 years ditto	3	3	0
To Mary Denson, for 25 years ditto	2	2	0
To John Stride, for 44 years ditto	3	3	0
To John Tylee, for 42 years ditto	2	2	0
To Christopher Walk, for 40 years ditto	3	3	0
To Priscilla Tugwell, for 22 years ditto	2	2	0
To Lewes Jones, for 30 years ditto	3	3	0
To Betty James, for 25 years ditto	3	3	0
To Betty Heaven, for 21 years ditto	2	2	0
To Mary Tucker, for 16 years ditto	3	3	0
To Richard Horner, for bringing up 11 children, with parochial aid	3	3	0
To Wm. Fisher, for so bringing up 9 children	3	3	0
To the Friendly Society at Sodbury	10	10	0
To three Candidates and Servants, at a publick Trial of Ploughs	14	14	0
To Ann Fussill, for reaping 5 acres of wheat	3	3	0

*Miscellaneous Premiums, given for the year 1789.*

To Mr. James Smith, of Corston, for rearing a dozen excellent Ram Lambs, for improving the breed of sheep	—	—	10	10	0
To Mr. Thomas Parsons, for the raising and management of a fine crop of Flax	5	5	0		

£. s. d.

To Mr. Laurence Field, for plans and elevations of Cottages for gentlemen's estates	3	3	0
To Richard Hatch, for burning 140 bushels of fern-ashes	3	3	0
To Mr. H. Murrell, for the invention of a valuable Washing-Machine	3	3	0
To James Sutton, for 27 years servitude	2	2	0
To Mary Hawkins, for 44 years ditto	2	2	0
To Joseph Hewlett, for bringing up 11 children without parochial aid	3	3	0
To Thomas Crook, esq; for rearing a number of Calves without milk	6	6	0
To William Herne, for 60 years servitude	2	2	0
To William Harris, labourer in husbandry, for bringing up 7 children without parochial aid	3	3	0
To Henry Hill, labourer in husbandry, for bringing 6 children in the same manner	2	2	0
To Mr. Lewin Tugwell, for raising and twice hand-hoeing a large crop of Turnips	7	7	0
To Sarah Bryant, for 27 years servitude	2	2	0
To William Palmer, labourer in husbandry, for bringing up 10 children without parochial aid	3	3	0
To William Brewer, labourer in husbandry, for bringing up 8 children in the same manner	2	2	0
To Ann Lawrence, for reaping 13 acres of wheat	3	3	0
To James Amel, for 37 years servitude	2	2	0
To Rose Bush, for 38 years ditto	2	2	0

*Premiums given for the year 1790.*

To William Dyke, esq; for the first prize at the Trial of Ploughs	6	6	0
To his Ploughman	2	1	0

£. s. d.

To Mr. John Thomas, for the second prize at the Trial of Ploughs	—	—	4	4	0
To his Ploughman	—	—	0	10	6
To Farmer Pritchard, for the third prize at the Trial of Ploughs	—	—	2	2	6
To his Ploughman	—	—	0	5	0
To Mr. J. Holbrook, for superior Ram Lambs	—	—	5	5	0
To John Burge, labourer in husbandry, for bringing up 14 children without parochial aid	—	—	3	3	0
To William Dyke, esq; for using Oxen in husbandry, and stating the comparative expense and utility of the same against those of horses	—	—	10	10	0
To the same Gentleman's Servants, for merit in driving Oxen and Drilling Corn	—	—	5	5	0
To John Randall, labourer in husbandry, for bringing up 7 children without parochial aid	—	—	3	3	0
To John Hopkins, labourer in husbandry, for bringing up 6 children in like manner	—	—	2	2	0
To Mr. Charles Fitchew, for attention to Drilling Experiments on his farm	—	—	5	5	0
To Mr. Joseph Wimpey, for Essays in Agriculture	—	—	10	10	0

*Premiums given for the year 1791.*

To John Billingsley, esq; for having the best and cleanest crops of Corn, and his farm in best order	—	—	10	10	0
To the Servants of R. P. Anderdon, esq; for drilling and horse-hoeing	—	—	3	3	0
To William Carpenter, for bringing up a family of 8 children by labour in husbandry	—	—	3	3	0

To William Dyke, esq; for improvement on the Double Plough; plate	5 5 0
To Mr. Thomas Lewis, for a fine crop of Turnips; plate	5 5 0
To William Atwood, for having 55 hives of Bees, after taking 29 this year	3 3 0
To Mr. T. Morse, of Newent, for raising up- wards of 600 Crab-Stocks for grafting, from one year's sowing; plate	5 5 0
To Thomas South, esq; towards expence of drawing and engraving Plates, to exemplify the Growth of Oaks, &c.; plate	10 10 0

*Premiums given for the year 1792.*

To Mr. Robert Davis, of Minehead, for culti- vating Rhubarb	5 5 0
To the Rev. Mr. Broughton, of Twerton, for his exertions in the culture of the Turnip- Cabbage	5 5 0
To John Fry, labourer in husbandry, a bounty for bringing up children	3 0 0
To Mr. Vagg's Woman-Servant, for hoeing Turnips	2 2 0
To Mr. Davis, of Longleat, for Plans of Cottages	5 5 0
To the same, for an Essay on Planting and the state of Woods	5 5 0
To Mr. Charles Fitchew, for a crop of fine Turnip-rooted Cabbage, with account of the same	5 5 0
To William Dyke, esq; for ploughing 800 acres with the Double-Plough	6 6 0

L. s. d.

To Joseph Mighill, esq; for an experimental Account of a Flock of South-Down Sheep	10 10 0
To the Servants of the same Gentleman, for using meritoriously the Drill-Plough and Horse-hoe	4 14 0
To Mr. John Gale, for an Account of an experimental crop of Buck-Wheat as a fallow crop	5 5 0
To sundry Premiums for Ploughing	10 10 0
To sundry Ploughmen and Assistants, for encouragement	3 3 0

*Premiums and Bounties granted for the year 1793.*

To John Billingsley, esq; for experiments on six sorts of Sheep, through one year, with account	21 0 0
To Mr. Redman, of Sarum, for an improved Lamp	3 3 0
To Two Servants of Mr. Pinkney, for meritorious Drilling	3 3 0
To Mr. Moxham, of Bradford, for Model of Threshing and Winnowing Machine	5 5 0
To Mr. Powell, of Samley, for constructing a good Reservoir for his Drainings	5 5 0
To Henry Vassal, esq; of Winterbourn-Court, for Ploughing 208 acres with the Beverstone Plough, and no driver	5 5 0
To Richard Lane, for ingenuity in Sieve-making, a bounty	5 5 0
To John Bootyer, of Stoke-St.-Gregory, for bringing up children without parochial aid	3 3 0
To Joseph Howell, of Brixton-Deverill, for bringing up 10 children without parochial aid	3 3 0
To John Merriman, of Great-Bedwin, for 39 years servitude	3 3 0

£. s. d.

To John Hicks, of Sydling-St.-Nicholas, for bringing up 9 children without parochial aid 3 0 0

*Premiums and Bounties granted for the year 1794.*

To Mr. White, of Ilchester, for the best exhibition of Horned Cattle for stock, consisting of

• a young Devonshire Bull, his Sire and Dam, and another Devonshire Cow; a silver bowl 21 0 0

To Mr. Davis, of Longlear, for a valuable prize

• Essay on a Commutation for Tithes; plate, value — 10 10 0

To Mr. Lansdown, of Mells, for an Apparatus for expelling Foul Air from Coal-Pits, and introducing fresh, by means of very convenient

• flexible tubes — 10 10 0

To the Rev. Mr. Broughton, of Tewerton, for

• an excellent crop of Turnip-Cabbage, and an account of its value in feeding cattle; plate, value — 5 5 0

To Dr. Fothergill, for an useful Essay on the pernicious effects of Spirituous Liquors, calculated for dispersing among the laborious classes of the community; plate — 5 5 0

To William Lewis, of Bath, smith, for constructing a simple and useful implement for preventing the injurious growth of the Horns of Sheep; a bounty — 1 1 0

To E. Sanders, of West-Lavington, for reaping in a handsome manner  $6\frac{1}{2}$  acres of Wheat 2 2 0

To John Knight, servant to William Dyke, esq; of Syrecot, for drilling in a workmanlike manner, in his first year of trial, 200 acres of Wheat — 2 2 0

£. s. d.

To Messrs. Bridge, Banger, &c. three several premiums of six guineas, four guineas, and two guineas, for different degrees of excellence in ploughing, at the ploughing-match in Dorsetshire last spring; together with one guinea, half-a-guinea, and 5s. to the Ploughmen, as awarded by the Committee of Inspection	14 8 6
To Thomas Dennis, labourer in husbandry, of the parish of Charlton-Adam, for bringing up 10 out of 15 children without parochial aid	3 3 0
To Tho. Baker, servant to Mr. George Crocker, of Wayford, for 5 years faithful probationary servitude, after 24 years prior servitude	3 3 0
To Elizabeth Williams, servant to Mr. John Adams, farmer, of St. Cuthbert in Wells, for 5 years faithful probationary servitude, after many years prior servitude	3 3 0
To Thomas Skammell, carter, of Berwick-St.-John, for bringing up 7 out of 10 children without parochial aid	3 3 0
To Thomas Collier, labourer in husbandry, of Wroughton, for bringing up 8 out of 10 children without parochial aid	3 3 0

*Premiums and Bounties granted for the year 1795.*

To the Marquis of Bath, for an important experiment, during near four years, on six sorts of Sheep, viz. the native <i>Mendip</i> , the <i>Dorsetshire</i> , the <i>Wiltshire</i> , the <i>Cotswold-Hills</i> , the <i>South-Down</i> , and the <i>Leicestershire</i> , all kept, folded, and fatted together; by which it appears, that the preference was decidedly and greatly in favour of the <i>South-Down</i> , for hard driving and folding; plate, value	— 21 0 0
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L. 1, 1.

To Mr. Jeanes, of Alhampton, for his demonstrated skill in the Cure of the Rot in Sheep, subject to his making a full discovery, when he shall think proper, of his medicine, and mode of application; plate, value	21 0 0
To the Rev. Thomas Broughton, of Twerton, for the best two-toothed Ram; plate, value	5 5 0
To Richard Bright, esq; of Bristol, for the finest and most valuable Fleece of Wool; plate, value	5 5 0
To Dr. Parry, of Bath, for the second best; plate, value	3 3 0
To Martha Ramble, of West-Lavington, for reaping	2 2 0
To Mary Hawkins, of Dundry, Somerset, for 49 years faithful servitude, in the same place	3 3 0
To James Sutton, of North-Cheriton, Somerset, for 32 years ditto	3 3 0
To Sarah Bryant, of Doynton, Gloucestershire, for 32 years ditto	3 3 0
To Betty Cox, of Doynton, Gloucestershire, for 25 years ditto	3 3 0
To Francis Forber, of Henlade, Somerset, for 13 years ditto	3 3 0
To John Nutland, of Lavington, Wilts, for 49 years ditto	3 3 0
To B. Charles, of Naunton, Gloucestershire, for 27 years ditto	3 3 0
To Edward Foot, near Castle-Cary, Somerset, labourer in husbandry, for bringing up 7 out of 11 children without parochial aid	3 3 0
To Aaron Welman, labourer, of Ogborn-St.-George, Wilts, for bringing up in like manner 8 children	3 3 0

£. s. d.

To Thomas Faulks, of Stroud, Gloucestershire, for bringing up in like manner 9 out of 11 children	—	3 3 0
To Robert Thring, labourer, of Milborne-Port, Somerset, for bringing up in like manner 9 children	—	3 3 0

*Premiums and Bounties granted for the year 1796.*

To his Grace the Duke of Bedford, for the finest Fat Sheep; plate, value	—	5 5 0
To John White Parsons, esq; for the best Ram; plate, value	—	10 10 0
To ditto, for the finest fat Steer; plate, value	5	5 0
To John Billingsley, esq; for the best Ram's Fleece; plate, value	—	5 5 0
To William Whitaker, esq; for a fine Ewe's Fleece; a bounty, plate, value	—	3 0 0
To Mr. John Jeanes, for making four sorts of experimental Cyder; plate, value	—	10 10 0
To Mr. Joseph Holbrook, for a fine crop of Turnip-Cabbage; plate, value	—	5 5 0
To the Rev. Thomas Broughton, for an expe- rimental crop of Potatoes, planted in various ways, with an Account of the same; plate, value	—	5 5 0
To the Rev. William Quartley, for the finest young Bull, Sire and Dam, Devon breed; plate, value	—	10 10 0
To the Riston Friendly Society, regularly esta- blished	—	10 10 0
To the Servant of William Dyke, esq; for ex- cellence in Drilling	—	3 3 0

	L. s. d.
To Jane Hancock, of Lavington, for reaping six acres and half of Wheat	2 2 0
To Mr. Philip Whitaker's Woman-Servant, of Bratton, for reaping 5 acres and half of Wheat	1 1 0
To John Hoskins, labourer, for communicating useful Hints, on his own experience, for preserving Orchard-Crops	3 3 0
To George Pipe, labourer, in Somerset, for bringing up 7 children without parochial aid	3 3 0
To Tho. Dossill, Wiltshire, labourer, for bringing up in like manner 7 out of 10 children	3 3 0
To Matthew North, of same county, labourer, for bringing up 8 children in like manner	3 3 0
To Michael Tap, of Dorset, for 52 years servitude, and bringing up several children in like manner; a bounty	2 2 0
To John Merriman, for 33 years previous, and 7 years probationary, servitude	3 3 0
To Rose Bush, for 38 years previous, and 7 years probationary, servitude	3 3 0

*Premiums and Bounties granted at the Annual Meeting*

1797.

To Mr. John Axford, of Estcourt, for a crop of Weld; a bounty, plate, value	10 0 0
To J. Gale Everett, esq; for the best and cleanest Crops, 1797; a bounty	10 0 0
To the same, for the best crop of Turnips, sown last year, hoed	5 5 0
To Mr. Bridge, for a capital crop of Autumn Turnips, hoed	5 5 0
To George W. Hall, esq; for a capital improvement by Soapers'-Ashes; a premium	5 0 0

£. s. d.

To the same, for Liming and Marling Land	1	0	0
a premium	—	5	0
To Mr. Crook, for best two-toothed Ram	1	0	0
To the same, for three best fat Sheep, shewn at this meeting	—	5	15
To T. W. Coke, esq; for a very fine single Sheep	1	0	0
To Mr. Moger, for excellence in Horned Rams	5	0	0
To the Rev. Thomas Broughton, for the most valuable Ram's Fleece, from the Spanish mixture	—	5	15
To Dr. Parry, in consideration of his great care and attention to the improving the quantity and value of a Fleece of Wool, without in- creasing the weight of the animal, &c. &c.	—	3	0
To Mr. Highett, of Maiden-Bradley, for erect- ing the most complete Threshing and Win- nowing Machine	—	20	0
To Mr. Exter, of the county of Devon, for his important Experiments in the Drill-Huf- bandry, and an Account of same	—	10	10
To Paul Matthews, of Radstock, Somerset, for bringing up 9 children without parochial aid	—	3	3
To Thomas Howse, of Stoke-Gregory, So- merset, for so bringing up 8 children	—	3	3
To Thomas Waldron, of Ogborne-St.-George, Wilts, for so bringing up 7 children	—	3	3
To John Haines, of Figel-Dean, Wilts, for so bringing up 7 children	—	3	3
To Elizabeth Collier, of Bitton, for 29 years servitude in the same place	—	3	3
To Mary Baker, of Beaminster, 28 years ditto	—	3	3
To Eliz. Brown, of Heddington, 35 years ditto	—	3	3

L. s. d.

To Ann Hayward, of Tytherington, for 27 years servitude	3	3	0
To Tho. Bayly, of Alton-Priors, 54 years ditto	3	3	0
To James Willis, of Huddington, 40 years ditto	3	3	0
To J. Sutton, 34 years ditto	3	3	0
To Thomas Read, 29 years ditto	3	3	0

*Premiums and Bounties granted at the Annual Meeting*

1798.

To Jeremiah Whippey, of Street, Somerset, for having brought up to more than 7 years of age, by his labour in husbandry, without aid from the parish, a large number out of 20 children	3	3	0
To Thos. Lucas, of Donhead-St.-Mary, Wilts, for bringing up in like manner 8 children	3	3	0
To William Spencer, of Berwick-Basset, Wilts, for bringing up in like manner 9 children	3	3	0
To John Hawker, of Curry-Mallett, Somerset, for bringing up in like manner 8 children	3	3	0
To John Bartlett, of Woodborough, Wilts, for faithful service in husbandry in one family 65 years	3	3	0
To John Thomas, of Luxborough, Somerset, 30 years ditto	3	3	0
To James Batten, of N. Petherton, 29 years ditto	3	3	0
To Joseph Budgell, of Nether-Compton, Dorset, 27 years ditto	3	3	0
To Elizabeth Noyes, of Enford, Wilts, for faithful service in a farm-house 45 years	3	3	0
To Rebecca Hunt, of Corsley, Wilts, 31 years ditto	3	3	0
To Mary Battin, of Wishford, Wilts, 28 years ditto	3	3	0
To Sarah Hughes, of Fifield, Wilts, 27 years ditto	3	3	0

L. s. d.

To Benjamin Reynolds, the shepherd of F. D. Astley, esq; for very meritorious servitude in the same station and family 60 years	3 3 0
To Mary Edwards, a young woman of 16, for meritorious labour in harvest	1 0
To the Rev. Mr. Gapper, as the first prize won with the Beverstone Plough, drawn by four oxen, at the publick Trial of Ploughs	6 6 0
To John Billingsley, esq; as the second prize, won with the double plough and six oxen	4 4 0
To Mr. Derrick, as the third prize, won with a swing plough and four oxen	2 2 0
To Ploughmen and Servants, worthy of en- couragement	2 6 0
To Hannah Curtis, of Milborn-Port, a poor blind woman, for excellence in Spinning Flax	2 2 0
To Betty Logdin, of Lavington, Wilts, for reaping 6 A. 2 P. of wheat	2 2 0
To Mr. Whitaker, of Bath, for the most valua- ble Ram's Fleece	5 5 0
To Dr. Parry, for the most valuable crop of Cabbages for cattle	5 5 0
To Mr. Bridge, of Winford, Dorset, for plough- ing 100 acres of land with a pair of oxen, without a driver	5 5 0
To Mr. Joyce, of Freshford, for fulfilling the request of the Society, in manufacturing and producing very valuable samples of Broad- Cloth, from wool of the Spanish and South- Down mixture; a bounty	5 5 0
To Mr. Collett, of Bathwick, for a similar atten- tion to another mixture of wool with the Spanish.	3 3 0

	£. s. d.
To Mr. Lindon, for the best fat Steer	5 5 0
To Mr. Bishop, jun. for merit in producing a very fine fat Ox; a bounty	5 5 0
To Mr. White Parsons, for producing the best Heifer, with her offspring, of foreign admixture	5 5 0
To the same, for the best Ram; a bounty	5 5 0
To Mr. Crook, for the finest Bull, for breeding stock from; premium	5 5 0
To the same, for superiority in fat Sheep; a bounty	5 5 0

## ART. XXVII.

*A Series of Experiments in Potatoe Planting.*

[By DAVID SWEET, esq.]

In a Letter to the SECRETARY.

SIR,

AS the following experiments, which induced me to trouble you with this letter, will speak for themselves, I shall only beg leave to observe, that my labourers are so sensible of the value of a small potatoe, that what before they gave to their poultry, or threw away, they now preserve; which will be a saving to them of many shillings. For my own part, I shall always make use of them, and if I am (as I am in hopes I shall be) able to make a Plough for Drilling of Potatoes, much expence and time will be saved.

EXPERI-

## EXPERIMENT I.

Planted in the field, May the 12th, 1795, one-third of an acre with small potatoes, about 12 to the pound—the produce 40 bags, of 160 lb. to the bag.— $40 \times 160 \times 3 = 19,200$  lb. per acre.

## EXPERIMENT II.

Planted in the Garden the 3d June.

	Produce.	Weight.
No. 1.—3 whole potatoes, 1 lb. each, having 76 eyes, planted 4 feet a part, and 3 wide	Potatoes.	lb.
2.—4 whole ditto, $\frac{1}{2}$ lb. each, 32 eyes, planted 3 feet each way	117	$28\frac{1}{2}$
3.—12 whole ditto, together 1 lb. planted 2 feet apart, in drills 15 inches asunder	106	28
4.—12 ditto of 1 lb. cut in half, a foot apart, in drills 2 feet asunder	these two mostly destroyed by the pigs getting into the garden; but about 18 lb. left uninjured, weighed half a pound each.	
5.—71 cuttings of large potatoes, 1 eye each, 1 foot apart, the drill 16 inches asunder	122	36
6.—71 cuttings ditto, with 2 eyes in each, planted as No. 5	174	39

## EXPERIMENT III.

Planted the 27th of April, 1796.

No. 1.—3 lb. of potatoes, 24 to the pound, put in whole	Produced	110
2.—3 lb. ditto, 24 to the lb, cut in half		126
3.—1 lb. ditto, 60 to the pound, put in whole		60
4.—1 lb. ditto, 60 to the pound, cut in half		96
5.—1000 potatoes, 42 to the pound, (making near 24 lb) put in whole		664

Each potatoe, and half potatoe, planted 6 inches apart, in drills 20 inches asunder, and twice houghed.

EXPERIMENT IV.

In a small bed.

	Produce.	Weight.
	Potatoes.	lb.
1.—3 whole potatoes, 42 to the pound, 6 eyes in each	—	75 8½
2.—6 half ditto, 3 eyes in each	—	56 12
3.—12 quarter ditto, 1 and 2 eyes in each	131	23

Each potatoe, half and quarter, planted in a square of 18 inches; these potatoes a small early sort.

EXPERIMENT V.

Planted on the 24th and 25th of June, 1796, in a bed, in which were early spring cabbage, about 28 lb. weight of potatoes, whole and in cuttings; they were taken up the 11th November, remarkably fine.

I should have observed, that the potatoes produced from Experiment the Third, were very fine. I am sorry the frost prevents my opening the heap, as I should have been happy to have sent the Society a specimen of them, as well as of the Fifth Experiment.

I am, sir,

Your obliged humble servant,

DAVID SWEET.

*Gittisham, Devon,*

*8th Dec. 1796.*

ART.

## ART. XXVIII.

*An Account of some Experiments in raising Potatoes from Seed, with Reflections on the same.*

In Letters to the SECRETARY.

[By MR. NEHEMIAH BARTLEY.]

DEAR SIR,

Bristol, Dec. 4, 1794.

I Have about a bushel of potatoes raised from seed, which are very much at the service of the Society, to be disposed of to such gentlemen as may have curiosity to plant them the ensuing season. The seed was from the Warminster red potatoe, and sown early in the spring 1792. There are several varieties, and not one of them, as I think, exactly resembling the parent stock.

A notion prevails in Lancashire, and some other potatoe countries, that after a certain period the cuttings, or off-sets, are apt to degenerate in quality, as well as in power of producing abundant crops—whereas it is thought, that potatoes raised from seed continue to improve in both respects for a considerable number of years.

The culture of the potatoe is pretty generally understood to be of great national importance; and cannot, as I imagine, be too strongly recommended. The quantity of farinaceous matter in any given weight,

weight, I presume, is that which chiefly constitutes its value. I have known 1-4th part to have been produced, or 56lb. from a sack of 224lb. corresponding in some sort with what I have heard from many poor labourers, that a sack of potatoes is of more value, as an article of food in their families, than a bushel of wheat. A crop of 200 sacks of potatoes hath been produced from an acre of ground; and I am persuaded, that in general it is more easy and certain to raise 100 sacks, than 25 bushels of wheat on the like quantity.

I remain, sir,

Your's most sincerely,

NEHEMIAH BARTLEY.

[N.B. The offer of Mr. BARTLEY, with regard to the potatoes raised from seed, was partly accepted; but the quantity had been accidentally diminished and injured in his custody—and the parties to whom the remainder were given for experiments, having failed to transmit accurate accounts, no experiments worth notice could be recorded.—But the following letter, which pursues the same subject, renders it still more important.—ED.]

To

To the SECRETARY.

Lawrence-Hill, near Bristol,

December 6, 1798.

SIR,

IT having been a prevalent opinion, that the potatoe produced from seed would require several years for raising it to a state of maturity or perfection; and, from my own observation, having had reason to think it might reach maturity within the first year, I was, in the last spring, induced to try the experiment.

I should have sown early in the month of April, had it been in my power to procure the seed; but it was with much difficulty I could get any, there being none in the Bristol seed-shops; and by mere chance I got a single ounce at one of the London shops. It was not, therefore, till the 19th of May that I was enabled to sow the seed; which was done in drills with two feet intervals. About a month afterwards, the plants were in a state to be removed from the seed-bed; they were accordingly transplanted in drills, at the distance of about seven inches from plant to plant, with three feet intervals. And this, I imagine, to be the most eligible scale for planting the potatoe in general, whether it be the seedling plants or shoots from the bulbs. The earth in the intervals was drawn up from time to time to the plants, in proportion as they advanced in growth. About the beginning of September they seemed

seemed to have acquired the usual size, and all the mould which the intervals afforded had been applied to them.

About this time also, the plants began to put forth blossom—of which circumstance, as being thought somewhat novel, I took the liberty to apprise you; and when you favoured me with a visit sometime afterwards, you will recollect they were in fair and general bloom. And notwithstanding the unfavourable circumstance of the seed having been sown so late, I persuade myself the plants would have produced seed, had not a remarkably severe frost intervened at a period of the season uncommonly early, by which means they were entirely cut off. Yet, a great number of the bulbs had acquired a mature size, as appeared by specimens presented the Society on the 13th of November last.\*

To those gentlemen who may be desirous of pursuing this experiment, I would recommend their sowing about the beginning of April; or even sooner in the season, were it not for the danger of frost, of which this exotic<sup>t</sup> plant is very susceptible.

Four ounces of seed would produce plants sufficient to stock an acre of ground, on the scale I have mentioned.

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\* The potatoes so produced were evidently of sound, perfect substance, and of good size.—ED.

† Would not propagating by seed be the most economical method of naturalizing it?

The soil on which these plants were raised was a deep, sandy loam, without the addition of any artificial manure.

It may be matter of future consideration, to what extent this mode of cultivating the potatoe may supersede the present one, of propagating by shoots from the bulb. But the more obvious advantages seem to be, the production of new, and, perhaps, better varieties; as well as by a timely recurrence to the seed to renovate the species, which are generally understood to decline in prolificacy after certain removes therefrom, and that at no very distant period of time.

I remain, with esteem, sir,

Your very obedient servant,

NEHEMIAH BARTLEY.

[The Society learns with pleasure, that Mr. BARTLEY is pursuing further his experiments on cultivation from seed, which he considers as the source of discoveries and excellencies, respecting *kinds* as well as *crops*; and which he hopes to treat of in a pamphlet, for the publick advantage. From his known ingenuity, veracity, and love of useful science, much valuable matter may be expected, should he realize his present views.—ED.]

## ART. XXIX.

*An Account of an easy Method of Manuring for Potatoes; and on the Management of Swine, &c.*

In a Letter to the SECRETARY.

[By JAMES WICKINS, esq.]

*Pondhead-Lodge, near Lyndhurst,*

DEAR SIR,

Hants, Oct. 24, 1798.

I Have been from home, and otherwise engaged, or your last favour should have met an earlier reply.

The only experiments that have lately occurred to me are, the appropriation of the early turnip-green to autumnal feed for sheep and cattle, (as hinted in my last;) and the substituting in the place of dung, for the culture of potatoes, the shovellings from the woods, consisting of light mould, long exposed to the influence of the atmosphere, and fertilized thereby, together with the fallen leaves. The dung from hogs and other cattle, rotten wood, and a variety of other compost collected during the winter, and applied to the potatoe-grounds in the spring by ploughing in, and depositing the seed along with it in the furrow. I have of late years been in the habit of adopting this compost, which I have found

very

very nearly equal, and in some soils superior to dung. And it has relieved me from a great inconvenience—that of applying prime dung to this purpose, and feeling the want of it during the whole year afterwards. I find the potatoes, from this mode of culture, much more meally, and of a flavour much finer than when produced by the application of the richest dung; and I consider it as an object of *especial* importance to cottagers and other poor people, who have not the means of raising dung—but may always come at the compost which I recommend. For, although it may be deemed applicable only to the woody countries, yet *every* country will afford it from the hedge bottoms, the ditches, old ponds, &c.

The next article which occurs to me, is the application of potatoes to the feeding of hogs. I have tried *every* mode of application, and find after all the following to be the best: namely, I *breed* and confine all my hogs in an inclosed wood park, appropriated almost solely to this purpose during the spring and summer; and about the beginning of October I let such of them *only* as I mean to fatten into the farm-grounds, where they have the run of the stubbles, the clover-fields and pastures, and even the turnip-grounds, taking care to have them first well wrung. I then have a pretty large fold prepared for them upon my potatoe-ground, into which they are driven every evening; and over every fold I order a sprinkling of good old horse-beans. Here they well fill themselves.

themselves. They lie warm and dry upon the haulm of the potatoe, and by leaving behind them a great quantity of the finest and strongest dung upon the ground, they amply repay what they take away from it. If the potatoe-ground be dry, and not sufficiently easy for their working the potatoes, a light plough must be run over it to facilitate this business, and *they* will do all the rest.

This being the state in which nature seems to have meant the hog should find his food, and having wisely formed the snout for this purpose, I am more and more convinced, that he derives more *relish* and more nutriment from potatoes thus found, than if *given* to him in any other way. For if they are thrown to him in the sty, he presently satiates!—he dunges upon them, and loathes them.

I have tried boiling, steaming, and various other methods, but I find this the best;\* for the cold watery quality of the potatoe is corrected by the warmth of the bean; and the hogs being shut out from them during the greater part of the day, and replenished with a variety of green and other food, they come to the potatoes with redoubled glee and eager appetite at the close of it. The business being by this means done in the proportion of about two-thirds, the remaining third is soon accomplished, by taking them

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\* For young and growing store-pigs this distinction, if well founded, seems most applicable.—ED.

into the styes, and finishing them with barley-meal and peas, ground together, in the proportion of one-third of the latter, and which will be found to be much better applied this way than by mixing with the potatoes during the *whole* course of the feeding. And I am not sure that they will not come up tolerably saleable to the jobber or contractor, even from the potatoe-ground.

My next observation respects the *perpetuating of Clover Crops*; which I have hitherto during the last three years, with some probability of success, been aiming at under the following system:—

In the month of October I carry on and spread over my recent clover-grounds a good top-dressing of dung, ashes, &c.; this I suffer to lie in a loose, easy state during the winter, which shelters and invigorates the plant, and the better enables it to withstand the wet and frost. The beginning of April following I sprinkle over the whole of the ground fresh and good feed, at the rate of six pounds to the acre, with about half a bushel of rye-grafs, (if wanted.) I then run my fine dressing-harrows over it every way, which serves as an hoeing and cleaning to the former plants—distributes the top-dressing—admits the sun, air, and water to their roots—and deposits the fresh seed sufficiently deep for vegetation, by the pressure of an heavy roller over the surface.—Hence will arise an annual succession

of

of fresh plants, and the objection to the *instability* of the clover crop will, in some measure, be obviated.

Such, sir, are the observations which hitherto occur to me. Should any of them prove worthy the attention of the Society, or in any degree useful to the publick, my end will be amply answered; and they are much at your service.

I remain, with great personal esteem, and with ardent and respectful regard to the interests and the prosperity of the Bath Society,

Sir, your obliged friend and servant,

JAMES WICKINS.

P.S. If it be thought imprudent to suffer the hogs to overrun the turnip-crops, I answer, that they will only brouse upon the leaves, and not materially injure the roots.



## ART. XXX.

*An Account of a CROP of CABBAGE, for which a Premium was awarded.*

[By Dr. PARRY.]

PARTICULARS of a crop of winter cabbages, on three acres of land, part of a farm of fifty acres; value of land about 12s. per acre.

Eight rows of cabbages, in number 381, weighed  $6915\frac{1}{2}$  lb. Total number of cabbages on the three acres, 12,170. Total weight of the cabbages, (avoiding fractions) 98 ton 12cwt. Weight per acre, 32 ton 17cwt. and somewhat more.

It must be observed, that these cabbages were weighed with from an inch and a half to two inches and a half of stem. Had they been taken up and weighed with their roots, each cabbage would have weighed in addition to the above from 1 to 2 lb. Supposing each to weigh somewhat more than 1 lb. there would be an addition to the whole weight of nearly six ton, or two ton per acre. The cabbages were also weighed in the driest weather.

C. H. PARRY.

Bath, Dec. 4, 1798.

[N.B. It should be stated, in addition to the above, that though the ground was in itself so poor as to be really worth no more than 12s. per acre, on the average of the value of lands in the West of England; it was pretty well manured. But the crop was so abundant as to add another to the many proofs of the importance of cabbages in farming.—ED.]

**(1)** The following Report was received and read from Mr. JOYCE, and the Cloth brought for Inspection.

## ART. XXXI.

*A Statement of an Experimental Process of Manufacture, to ascertain the Value of ENGLISH WOOL from Sheep of a Spanish Mixture.*

[By Mr. JOYCE.]

In a Letter to the SECRETARY.

SIR,

Dunkirk-Factory, Dec. 7, 1795.

**A** GREEABLY to the request of the meeting in November last, I have the pleasure to send you, for the inspection of the gentlemen at the Annual Meeting, the cloth made from the wool I received from you, of the mixture of a Spanish Ram and South-Down Ewe.

As this wool was not washed, either before or after it was shorn, there has been consequently a considerable waste in it; but not more than what generally takes place in the Spanish wool. The waste in this latter depends entirely, as I understand, on the state of the flocks at *the time of shearing*. If they receive much wet in their passage from Estremadura to the washing-grounds, the arboe of 25lbs. in grease may render from 8½ lbs. to 10lbs. in white; but if they be shorn dry, and in good condition, it will yield 2 or 3lbs. more. After we receive the wool

into

into this country, it varies again from 3 to 4 lbs. per score in scouring. ~~which will be improved with no~~

The wool you sent us to manufacture was 60 lbs. in the grease. It was sorted into three parcels of different qualities. Of the first quality, when scoured, there remained 29 lbs.; of the second, 14 lbs.; and of the third, 12 lbs.; altogether 39 lbs. The waste was, consequently, somewhat more than one-third of the whole. This wool scoured exceedingly well; and when dyed blue, the best ran to 21 skeins, or 6780 yards to the pound, and made 14 yards of cloth; the second ran to 18 skeins, or 5770 yards per lb. and made 9 yards of cloth. The remaining piece (2 lbs.) was sent out for list; ~~it~~ <sup>it</sup> is highly worth about 6d. per lb. You will observe, that the cloth made from this wool does not prove in milling so well as that made from the best Spanish wool, by one yard in twenty. Had we received a larger quantity of the wool, we should have made more sorts of it; of course, the best sort of cloth would, in this case, have been finer, and would have proved better in milling.

We would recommend, in future, to those gentlemen who keep these kinds of sheep, to have them well washed before shearing. In that case, we should suppose that the wool would be worth from 2s. to 2s. 3d. per lb.

Large, the following will prove the best comparisons:

\* This price is to be considered as proper to periods when the price of Spanish wool is moderate—as before the year 1790. — Ed.

Any further information that I can give the Society on this subject, will be imparted with pleasure by

Sir, your's respectfully,

THOMAS JOYCE.

[N.B. This cloth being inspected by a Committee, and appraised, the best was found to be worth 15s. 6d. per yard, and the second sort 12s.—ED.]

ART. XXXII.

*Report concerning the publick Trial of Ploughing,*

*near Piper's-Inn, in October 1793.*

THE SECRETARY reports, that he attended the

Ploughing-Match at King's-Sedgmoor, &c. on the 10th of October.—That lots of a quarter of an acre each were measured and marked out in a field of strong land, near Piper's-Inn, for the commencement of the trial; and other lots of half an acre each, in King's-Sedgmoor, for the finishing of the same, the better to ascertain the relative value of the ploughs and workmen on different soils.—That a Committee being previously appointed out of such gentlemen present as were deemed the most competent to be judges, the following were that Committee:—

Lord SOMERVILLE,

Mr. COOMBE,

Mr. TRUTCH,

Mr. COLES,

AND

Mr. RICH,

The candidates who started, were, in the following order:

Mr. BILLINGSLEY, with a Double-Plough, and 6 oxen, first.

The same, single Swing-Plough, and 2 horses at length, driven, second.

Mr. YOUNG, with a Swing-Plough, and 3 horses at length, third.

Mr. HASSELL, with a Swing-Plough, and 3 horses ditto, fourth.

Mr. DERRICK, with a ditto, and 4 oxen in yokes, double, fifth.

Rev. Mr. GAPPER, with the Beverton-Plough, and 4 oxen in yokes, double, sixth.

That Mr. BILLINGSLEY's ploughs, happening to have very rocky lots, were injured soon after they began, and prevented from proceeding, as was one of the others. The remaining four finished their lots, of a quarter of an acre each, in the following time, viz.

Mr. YOUNG's, with 3 horses, in 1 hour 47 minutes.

Mr. HASSELL's, with 3 horses, in 1 hour 23 minutes.

Mr. DERRICK's, with 4 oxen, in 1 hour 23 minutes.

Rev. Mr. GAPPER's, with 4 oxen, in 1 hour 48 minutes.

That soon after one o'clock, the whole seven started again in the Moor, and finished their respective half acres as follows:—

	Hours.	Min.
Mr. BILLINGSLEY, with his Double Plough, 6 oxen	1	48
Ditto, with his Swing ditto, 2 horses	2	47
Mr. DERRICK, with his Swing ditto, 4 oxen	2	23
Mr. HILLERY, with his Swing ditto, 4 oxen	2	19
Rev. Mr. GAPPER, with his Beverton ditto, 4 oxen	1	48
Mr. HASSELL, } who started 20 minutes after the others, were Mr. YOUNG, } inferior in progress, and ended irregularly.		

The Committee, taking the whole day's performance into comparative consideration, in which goodness

ness of workmanship and the comparative expense and straining of cattle were estimated, determined the prizes as follow, viz.

1. To the Rev. Mr. GATHER the 1st prize
2. To Mr. BULLETT, for his 2d ditto
3. To Mr. DERRICK, the 3d ditto

With the usual allowances to the successful ploughmen, and small bonuses to several other servants who were deemed meritorious. And after spending a cheerful afternoon, in which it was allowed that this trial had been important to the interests of the meet, the company separated, without any unpleasant occurrence.

It should also be added, to the credit of the Western farmers, that, laying aside former prejudices, many of them are eagerly adopting the winning ploughs into common practice, under a full perception of the private and publick advantage of using them.

Mr. GATHER	Mr. BULLETT	Mr. DERRICK	Mr. HARRIS	Mr. Young
3 -	1 -	2 -	3 -	2 -
7 -	3 -	4 -	5 -	3 -
11 -	5 -	6 -	7 -	4 -
15 -	7 -	8 -	9 -	5 -
18 -	9 -	10 -	11 -	6 -

The Committee, taking the whole day's services into account, and excepting those of Mr. HARRIS, who fatigue 30 minutes after the other, were inferior in proportion, and ought to be paid.



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